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jc600 U.S. PTO 01/28/00

EL525650751US DN: P1056Prov.
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jc541 U.S. PTO 60/178825 01/28/00

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Larry Allen	Wares	Rancho San Margarita, CA

☐ *Additional inventors are being named on the ___ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

E-COMMERCE BID AND PROJECT MANAGEMENT SYSTEM AND METHOD FOR THE CONSTRUCTION INDUSTRY

CORRESPONDENCE ADDRESS

Direct all correspondence to:

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Address	P. O. Box 3140
Address	
City	Monterey
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ZIP	93942
Country	US
Telephone	831-649-8800
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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 4 including attch(145)

☐ Drawing(s) *Number of Sheets* ____

☒ Small Entity Statement

☒ Other (specify) Claims (2 Pages)

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Respectfully submitted,

SIGNATURE Victor Flores

Date 1/28/00

TYPED or PRINTED NAME Victor Flores

REGISTRATION NO. *(if appropriate)* 29,638

TELEPHONE 831-649-8800

Docket Number: P1056Prov.

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PATENT
Docket No. P1056PROV

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: LARRY ALLEN WARES

SERIAL NO.: FILED HEREWITH

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FOR: E-COMMERCE BID AND PROJECT MANAGEMENT SYSTEM AND METHOD FOR THE CONSTRUCTION INDUSTRY

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BOX PROVISIONAL APPLICATION
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WASHINGTON, D.C. 20231

TRANSMITTAL LETTER

Dear Sir:

In connection with the above-referenced matter, transmitted herewith are the following:

1. Provisional Application for Patent Cover Sheet (1 Page);
2. Specifications (4 Pages) including seven attachments:
    - ATTACHMENT A Home Page-Web Site (1 Page);
    - ATTACHMENT B Presently Available On-Line Service (1 Page);
    - ATTACHMENT C Specific Services Entitled: Screenshots (1 Page);
    - ATTACHMENT D Description Applicants S & E Company (2 Pages);
    - ATTACHMENT E Functional Specifications For: Bid Manager-Phase 1 (11 Pages);
    - ATTACHMENT F Project development & Manual (56 Pages);
    - ATTACHMENT G BUZZSAW Bid System (69 Pages);

2.a. Claims (2Pages);

3. Small Entity Status (Small Independent Inventor) (2 Pages);
4. Check No. 6705 in the amount of $75.00 for filing fee; and
5. Post card in acknowledgment of all transmitted materials.

Please date-stamp the enclosed post card and return same to the undersigned in acknowledgment of receipt of all transmitted materials.

Respectfully submitted,

Victor Flores

Victor Flores
Pat. Reg. No. 29,638

VF:pcl
January 28, 2000
LARIVIERE, GRUBMAN & PAYNE, LLP
Post Office Box 3140
Monterey, CA 93942
(831) 649-8800

Applicant or Patentee: Larry Allen Wares
Serial or Patent No. Filed Herewith Docket No. P1056Prov.
Filed or Issued
For: E-Commerce Bid And Project Management System And Method For The Construction Industry

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(c)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled:

described in x the specification filed herewith.
☐ application Serial No. ________ filed ________
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Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under no obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☐ No such person, concern, or organization.
x Persons, concerns or organizations listed below*.

* Note: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

NAME buzzsaw.com,inc.
ADDRESS 300 California Street, San Francisco,CA. 94104

☐ INDIVIDUAL x SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

NAME
ADDRESS
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further than these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to verified statement is directed.

28JAN00
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Larry A. Wares
LARRY ALLEN WARES

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Patent
P1056PROV

PROVISIONAL APPLICATION

E-COMMERCE BID AND PROJECT MANAGEMENT SYSTEM AND METHOD FOR THE CONSTRUCTION INDUSTRY

INVENTOR: LARRY ALLEN WARES

FIELD OF THE INVENTION

The present invention relates to construction industry bidding and project management system and methods. More particularly, the present invention relates to electronic commerce (e-commerce) based construction industry bidding and project management system and methods. Even more particularly, the present invention relates to electronic commerce (e-commerce) based construction industry bidding and project management system and methods, including document distribution, supply chain automation and on-line auctioning.

BACKGROUND OF THE INVENTION

In pre-construction phases, the construction industry traditionally relies on manual methods of bid collaboration, and dissemination of information and results. The bid manager's task is enormous and highly susceptible to inefficiencies and inaccuracies due to the predominantly manual means employed for completing the bidding task. Further, the construction industry professionals traditionally get bogged down with the multitude of tasks that not only have to be managed during the pre-construction bidding cycle, but also the multitude of tasks that have to be managed during the construction phase after the contract has been let. While the construction industry bidding process is well known, and is directed at obtaining the lowest possible price for the materials and labor, the bidding management tasks have not been centralized for being

comprehensively manipulated by available computer technology. Additionally, the subsequent tasks that need to be managed to track and monitor the construction project to completion are also limited to manual means.

By example, in the pre-construction phase discussed above, the construction industry bidding task traditionally concerns: (1) an owner purchasing land and employing the services of an architect and other consultants, (2) an architect employs services of specialty engineers and consultants, (3) an architect prepares bid documents concerning the construction project involved, (4) architects and owners seek low bids from qualified general contractors, (5) general contractors seek low bids from qualified subcontractors and suppliers, (6) subcontractor seek low bids from suppliers, wholesalers and building products manufacturer, (7) suppliers and wholesalers seek low bids from specified building product manufactures, (8) building product manufacturers submit bids, (9) suppliers and wholesalers submit bids and (10) subcontractor submits bid, and (11) general contractors submit all-inclusive bid. The activities involved by each bidder, by example providing specifications, plans and drawings, for winning the lowest bid are intense and involves an enormous amount of manual manipulation and dissemination of information by each bid participant.

Thus, while, there may be isolated computerized database for specifications, plans and drawings at the individual construction project participant's location, to applicant's knowledge, there are no known integrated computerized bidding and project management systems, other than the aforementioned non-integrated manual systems for manipulation and dissemination of information.

Accordingly, a need is seen to exist for an e-commerce based bidding and construction project management system and method, whereby, a variety of integrated bidding and construction project related databases are provided to the construction community for being manipulating using on-line computerized telecommunications technologies, known as the internet, for being disseminated to the various participants in a construction project.

It is therefore a primary object of the present invention to provide an integrated e-commerce based bidding and construction project management system and method, whereby, a variety of bidding and construction project related databases are provided to

the construction community for being manipulating using on-line computerized telecommunications technologies, known as the internet.

Another object of the present invention is to provide an integrated electronic commerce (e-commerce) based construction industry bidding and project management system and methods, including document distribution, supply chain automation and on-line auctioning.

BRIEF SUMMARY OF THE INVENTION

Accordingly, the foregoing objects are accomplished by an integrated electronic commerce (e-commerce) based construction industry bidding and project management system and methods, including document distribution, supply chain automation and on-line auctioning. In a pre-construction setting, the e-commerce based bidding and project management system and method of the present invention provides for a user, such as an owner, and architect, engineer, consultant, general contractor, sub-contractor, retail and wholesale supplier and building products manufacturer, the means for participating and competing in the bidding and construction project management tasks using on-line computerized telecommunications technologies, known as the internet. The on-line system and methodologies, help the participant to achieve cost efficiencies and performance enhancements that traditional prior art manual bidding and construction management systems and methods have not achieved.

The present invention is presently being marketed by buzzsaw.com, inc of San Francisco, California, and is accessible for on-line use at the website address of http:/buzzsaw.com/, (see generally the enclosed computer screen printouts labeled Attachments A, B, C and D), enclosed herewith and incorporated by reference as if fully set forth herein. These computer screen printouts depict the graphical user interface for navigating through various on-line services available to the participant. Additional supporting material in the form of project specifications Attachment E, F and G used for the development of the present invention are also attached and are also incorporated by reference as if fully set forth herein. These attachments are described below:

Attachment A.	Home Page-Web Site
Attachment B.	Presently available On-Line Service

Attachment C.	Specific Services	Entitled: Screenshots
Attachment D.	Description Applicants	S & E Company
Attachment E.	Functional Specifications	For: Bid Manager-Phase 1
Attachment F.	Project Development & Manual	
Attachment G.	Buzzsaw Bid System	

CLAIMS

What is Claimed is:

1. An e-commerce based construction industry bidding and project management system, said system comprising:

facsimile and e-mail bid solicitation means for use by general contractors and subcontractors;

a comprehensive database of subcontractors, suppliers and building product manufactures;

bid collaboration tool means for architects, engineers, general contractors and subcontractors;

means for selective downloading of electronic plan images;

means for key-wording search and downloading of project specifications;

means for networking blueprinters for hard copy reproduction of bid documents;

means for submitting and processing electronic bid submissions;

means for historical tracking of electronic bid results; and

database means for providing e-mail services, weather reports, trade association links, and news & event information.

2. An e-commerce based method of providing construction industry bidding and project management services, said said method comprising the steps of:

providing facsimile and e-mail bid solicitation means for use by general contractors and subcontractors;

providing a comprehensive database of subcontractors, suppliers and building product manufactures;

providing a bid collaboration tool means for architects, engineers, general contractors and subcontractors;

providing means for selective downloading of electronic plan images;

providing means for key-wording search and downloading of project specifications;

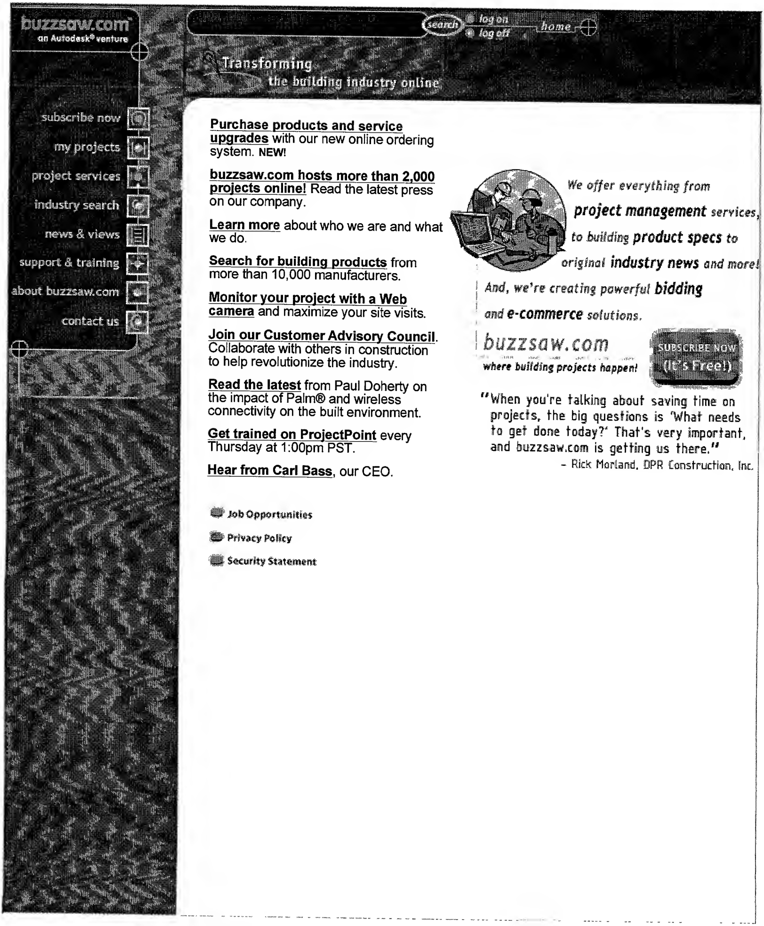
providing means for networking blueprinters for hard copy reproduction of bid

documents;

providing means for submitting and processing electronic bid submissions; providing means for historical tracking of electronic bid results; and providing database means for e-mail services, weather reports, trade association links, and news & event information.

ATTACHMENT A

HOME PAGE-WEB SITE



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Join our Customer Advisory Council. Collaborate with others in construction to help revolutionize the industry.

Read the latest from Paul Doherty on the impact of Palm® and wireless connectivity on the built environment.

Get trained on ProjectPoint every Thursday at 1:00pm PST.

Hear from Carl Bass, our CEO.

We offer everything from **project management** services, to building **product specs** to original **industry news** and more! And, we're creating powerful **bidding** and **e-commerce** solutions.

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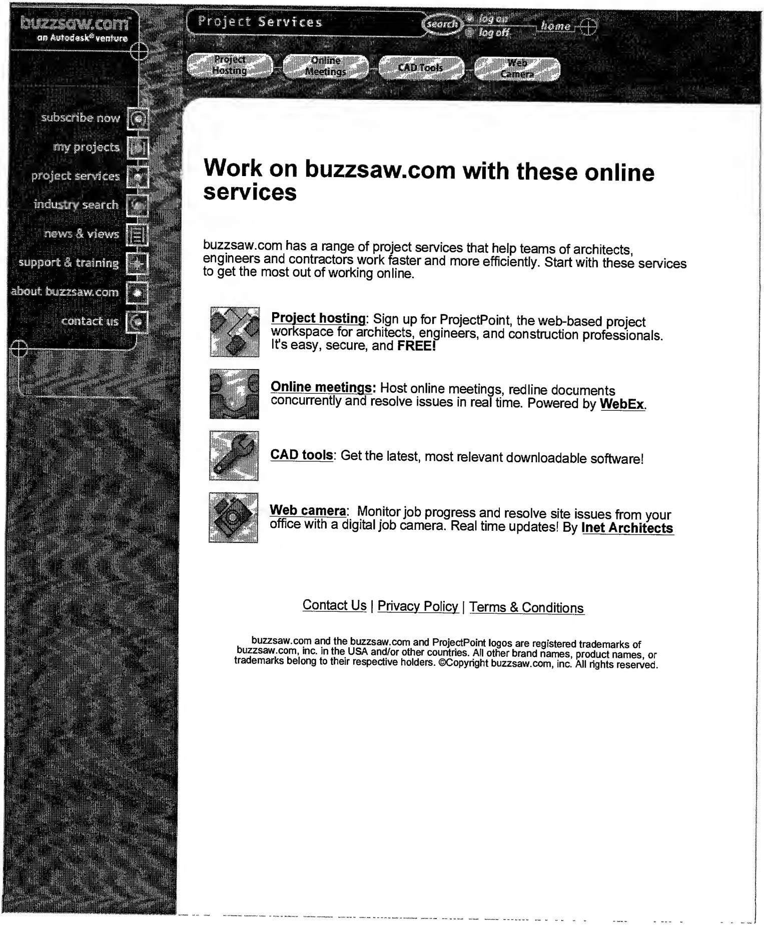
where building projects happen!

"When you're talking about saving time on projects, the big questions is 'What needs to get done today?' That's very important, and buzzsaw.com is getting us there."
- Rick Morland, DPR Construction, Inc.

Job Opportunities
Privacy Policy
Security Statement

ATTACHMENT B

PRESENTLY AVAILABLE ON-LINE SERVICE



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log on
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home

Project Hosting
Online Meetings
CAD Tools
Web Camera

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buzzsaw.com has a range of project services that help teams of architects, engineers and contractors work faster and more efficiently. Start with these services to get the most out of working online.

Project hosting: Sign up for ProjectPoint, the web-based project workspace for architects, engineers, and construction professionals. It's easy, secure, and **FREE!**

Online meetings: Host online meetings, redline documents concurrently and resolve issues in real time. Powered by **WebEx**.

CAD tools: Get the latest, most relevant downloadable software!

Web camera: Monitor job progress and resolve site issues from your office with a digital job camera. Real time updates! By **Inet Architects**

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ATTACHMENT C

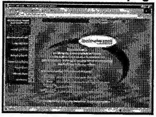
SPECIFIC SERVICES

ENTITLED: SCREENSHOTS

Screenshots

Click a link below to download a screenshot of one of the many services offered on buzzsaw.com.

buzzsaw.com home page



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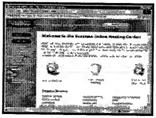
buzzsaw.com online meetings



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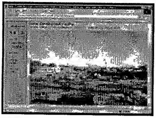

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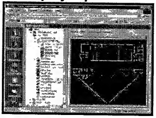
projectpoint



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ATTACHMENT D

DESCRIPTION APPLICANTS

All About buzzsaw.com

All about buzzsaw.com

buzzsaw.com is the building design and construction industry hub that delivers integrated business-to-business collaboration and e-commerce services for everyone in the building industry who needs a faster, more profitable way to work. buzzsaw.com leads the market with the most accessible and complete place to work on the web.

buzzsaw.com provides the building industry with integrated offerings for design collaboration, bidding, construction administration and buying. In addition, buzzsaw.com fosters an online community for information exchange by providing industry contacts, relevant reference material, pertinent news, and other services tailored to the needs of building professionals around the world.

With its free project hosting and online industry resources, buzzsaw.com is transforming the building industry. buzzsaw.com makes it easy for everyone working on a building project to participate online by providing an array of services and intuitive tools.

Founded in 1999 and headquartered in San Francisco, buzzsaw.com has established itself as the leader in Web applications and services for the building industry. buzzsaw.com is a privately held company backed by Autodesk®, Inc., the world's leading supplier of PC design software and digital content creation tools for the building industry. One of the largest software companies in the world, Autodesk has more than four million customers in over 150 countries.

The Market

The building design and construction industry is a $600 billion-plus industry in the US alone and more than $3 trillion worldwide. In the US there are tens of thousands of building product manufacturers, hundreds of thousands of suppliers, and millions of architects, engineers, and construction professionals all working on hundreds of thousands of building projects.

The project is the basic unit of organization in the building industry. Firms, divisions, individuals all organize themselves around individual projects to do specific tasks. All the work that gets done in design and construction--from the biggest office complex to the smallest renovation--is organized and measured the same way: by project.

Contractors, architects, engineers, managers, developers, reprographers, consultants--everyone involved in a building project--measure their success in terms of project success. A 'good' project is one that turns a decent profit. A bad project is unprofitable, which usually means it is late or behind schedule. A company's total profit is equal to the sum of its individual project profits, minus overhead expenses.

Every project is unique, with its own site, its own program, its own requirements, its own mix of construction methodologies, and its own project team. Every building is a prototype. Building projects face a high degree of risk, and it's the job of project managers to control expenses and budgets tightly in order to make money.

Project managers on all sides--design, construction, and development--work together as well as they can to keep information moving and decisions happening in order to make deadlines and meet milestones. A project manager's ability to do this job well depends entirely on their individual skills as a manager and their access to tools that allow them to monitor and manage their projects.

The tools for successful building project management

buzzsaw.com allows all building design and construction professionals to optimize profitability by providing them with tools that improve efficiency in the specific ways unique to each project. With the most complete and accessible set of Internet applications and services for the building industry, buzzsaw.com enables project managers and participants to choose the right tools for each project, thereby improving the flow of information to everyone.

Every member of buzzsaw.com's senior management team has building industry domain expertise, software application development experience, and Internet technology know-how. ProjectPoint, buzzsaw.com's secure design collaboration hosting service, was designed by building design professionals for everyday use in today's building industry. To date, ProjectPoint has been utilized on many successful building projects, and continues to spread to new users everyday.

The constant, overriding goal for building industry professionals is to wrap up whatever project they are on and move on to the next one. Invoices get paid only after work is completed. From an economic standpoint, firms in the building industry face up-front fixed costs (such as purchasing of materials, equipment, and other startup costs) and ongoing variable costs (primarily labor and consumables) on every project. That means the sooner they finish a project, the less that project costs them and the higher their profit margin. One extra, unplanned day of work for one crew could mean the difference between profit and loss for a subcontractor. Minimizing project overruns and delays is critical to everyone's profitability. buzzsaw.com is a powerful resource that improves communication and eliminates many of the variables that can negatively affect the bottom line.

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ATTACHMENT E

FUNCTIONAL SPECIFICATIONS
FOR
BID MANAGER-PHASE 1

Functional Specifications

Bid Manager – Phase I

Executive Summary

Bid Manager is a Pre-Construction Services Portal that enables commercial construction communities to participate in more efficient and cost effective bidding practices.

The construction industry traditionally relies on manual methods of bid collaboration, and while two of the industry's leading news and project information services have improved the offering of computerized data, no single entity has attempted to provide a comprehensive mechanism that offers all of the components required to process an accurate and timely bid. In addition to offering news and information about upcoming bids, Bid Manager's portal will enable a more efficient connection of audiences by providing the following services:

1. Fax and E-mail Bid Solicitation for General Contractors and Subcontractors
2. Comprehensive Database of Subcontractors, Suppliers and Building Product Manufactures
3. Bid collaboration tools for Architects, Engineers, General Contractors and Subcontractors
4. Selective downloading of electronic plan images
5. Key-word search and downloading of project specifications
6. Networking over 1,200 blueprinters for hard copy reproduction of bid documents
7. Electronic Bid Submission
8. Historical tracking and electronic Bid Results
9. General services including e-mail, weather, trade association links, news & events, Etc.

Bid Manager's success will be directly related to the following critical assumptions:

1. Plans and specifications can be seamlessly converted from their native .dwg format to a "Read Only" format that can be utilized for viewing, electronic estimating and digital printing
2. Development of a security mechanism that offers all levels of open or restricted access
3. An application interface that combines standard design and usability features with the idiosyncrasies of the construction community
4. Utilization of the best available technology for the internet

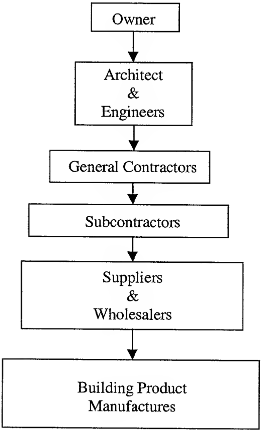
In an industry where time and information are highly strategic components of the "New Business" process, Bid Manager stands to offer what nearly all successful business are willing to pay for – ***A tool that minimizes resources and increases profits***. We have the technology. Data and other critical business components are readily available. The construction industry has been primed for Bid Manager. Raw talent and speedy execution will determine the stake that claims this new and exciting space.

Prepared By Larry Wares
March 30, 1999

Industry Overview

The systematic, almost methodical, bid process experienced by today's construction industry is a result of nearly 150 years of competitive bidding; and while the projects and players may differ from bid to bid the goal remains unchanged -- ***To obtain the lowest possible price for the best possible materials and labor.***

Byproducts created from the evolution of this process were eventually converted to standards. Construction professionals in North America and Canada have adopted many of these bid practice standards, one of which is the final deadline for bid submission at 2:00 PM -- ala ***Bid Manager***. In addition to bid submission standards architects and engineers believed that organization of the bid documents by trade discipline would result in better bids. Today plans and specifications are prepared in a way that enables all participants to narrow down their required scope of work and submit a qualified bid. The model below represents how the organization of bid information resulted in a complementary business hierarchy:



1. Owner purchases land and employs the services of an architect and other consultants
2. Architect employs services of specialty engineers and consultants
3. Architect prepares bid documents
4. Architect and owner seeks low bids from qualified general contractors
5. General contractors seek low bids from qualified subcontractors and suppliers
6. Subcontractors seek low bids from suppliers, wholesalers and building product manufactures
7. Suppliers and wholesalers seek low bids from specified building product manufactures
8. Building product manufactures submit bids
9. Suppliers and wholesalers submit bids
10. Subcontractors submit bids
11. General contractors submit all-inclusive bid

While the above model appears to conform to a typical business transaction structure one should note that an intense strategy for winning the low bid exists within system. The community will not accept merely providing a better vehicle for information dissemination -- they will expect to maintain their ability to prepare a competitive bid. The framers of Bid Manager must be cognizant of the specific requirements of competitive bidding as outlined in sections to follow.

Prepared By Larry Wares
March 30, 1999

Bid Process Overview

This section will describe the fundamental steps of the bid process. Emphasis will be placed on describing the unique roll each segment plays in the process. Bid Manager's infrastructure and interface should be flexible enough to accommodate "Look and Feel" customization by segment.

Types of Bids

Bid Manager will be primarily designed to meet the needs of the commercial/industrial and building industry; however, consideration for US infrastructure projects such as roads, dams and bridges should be implemented into the roots of the system for future use (see supplemental infrastructure design documents).

There are typically five (5) types of bid scenarios -- they are as follows:

1. **Public Works (City/State/Federal Government)** – Typically public works projects are open to anyone and everyone that qualifies to bid the project. Highly competitive bid environment. Strong consideration for "Equal Opportunity Employment" exists in most states. Preferential bidding, based on race, continues to be challenged across America. No such bidding criteria exist in Canada. Fields describing Minority, Women, Disadvantaged Veterans and Small Business may become a critical option for database design.
2. **Private Competitive Bid** – Private ownership(s) where more than one General Contracting bid is desired. Heavy competition amongst general contractors and subcontractors. Provisions for Union Labor may be required if funds come from Union lending institutions. Prevailing labor rates may be mandated if a portion of the funds come from a Government funding program. Database design should allow for identification of Union or Prevailing Wages.
3. **Negotiated Bid** – Ownership places confidence in a single General Contractor. General Contractor will solicit bids from qualified subcontractors and suppliers. Provisions for Union Labor may be required if funds come from Union lending institutions. Prevailing labor rates may be mandated if a portion of the funds come from a Government funding program. Database design should allow for identification of Union or Prevailing Wages.
4. **Design/Build** – Ownership selects one general contractor to assist architect with design and bid documents in order to meet the constraints of the development budget. Some design/build contracts call for the General Contractor as the lead in lieu of the Architect. General Contractor will solicit bids from qualified subcontractors and suppliers. Provisions for Union Labor may be required if funds come from Union lending institutions. Prevailing labor rates may be mandated if a portion of the funds come from a Government funding program. Database design should allow for identification of Union or Prevailing Wages.
5. **Re-Bid** – Sometimes a project will either come in over budget or the economy may adversely change and delay the bid award process. In these case a project may com out as a re-bid. For this reason provisions within the database design must accommodate re-bid projects.

Project types 2, 3 and 4 will require tight security controls that empower the owners, architects and general contracts with the ability to keep the project from getting into the hands of their competitors. This will be of great concern to Owners, architects, engineers and general contractors.

The Owner

Owners are typically comprised of the following entities:

1. Single entity/private ownership
2. Partnerships and joint ventures
3. Corporations (Wal-Mart, McDonalds, Etc.)
4. City, State and Federal Government agencies

While the owners roll in the bid process is typically limited to performance motivation, they will always want to have their fingers in every aspect of the process. The owners' main goal is to secure the financing and employ consultants that meet or beat the expectations of the financial pro forma.

Identifying qualified consultants and collaborating within Bid Manager will provide great value to the owner. Typical collaboration expectations from the owner are as follows:

1. Delivery of Request for Proposals (RFP's) to qualified architects and engineers
2. Exchanging design and building program requirements with architects and engineers
3. Identifying qualified consultants and requesting information about their services
4. Organizing meetings and job site visits with team members
5. Identifying qualified general contractors by work type and prior performance
6. Delivery of Request for Proposals (RFP's) to qualified general contractors
7. Reproduction and delivery of plans and specifications
8. Searching for and viewing currently available building product materials and requesting preliminary pricing
9. Providing press releases and other public relations information
10. Marketing and sales of real estate

The owner of the project will become a key advocate of Bid Manager's efficiency capabilities.

Architects and Engineers

Architects are typically expected to lead the bid process. Following receipt of a signed contract from the Owner the Architect will commence preparation of the following documents:

1. <u>Preliminary schematics</u> – Typically consists of a site plan, floor plan and conceptual elevations.
2. <u>Preliminary plan submission to City</u> – Agency specific requirements, but typically includes preliminary schematic documents accompanied by form documents provided by the local City or County.
3. <u>Preparation of Bid Documents</u> – Consists of all documents required to accurately bid the project. Bid documents also include Addenda – a change to the original bid documents.
4. <u>Plan Check</u> – Submission of final design documents for code and occupancy use review and approvals. Generally consists of all bid documents and any changes resulting from the bid process.
5. <u>Construction Documents</u> – Modified bid documents incorporating all comments from bidding process and plan check. Documents used to construct project.
6. <u>Contract Administration</u> – Some Architects may also coordinate prime contract agreements and perform other contract administration activities for the owner.

Critical elements for Bid Manager and the Architect are as follows:

1. **Project information** – Each project will be set up with its own unique profile. The architect must be able to quickly point and click on Bid Manager's pre-defined lists. Preferences must allow non-applicable list items to be hidden for quicker set-up. Project information may include, but may not be limited to the following:
    a. Title
    b. Location
    c. Bid Date and Time
    d. Owner Information
    e. Architect Information
    f. Consultant Information
    g. G.C.'s Bidding Information
    h. Type of project (Up to 25 types)
    i. Estimated valuation
    j. General Scope of work description (100 words)
    k. UCI/CSI list of trades or key word indexing on disciplines required

    Note: A cumulative list of bid participants by segment should be tracked and made available at the request of the security administrators.

2. **Bid document formats and organization** – Every project consists of plans, specifications, addenda and other related documentation. The purpose of these documents is to provide a consistent format for bid submission and create the basis for executing future contracts.

    a. **Plans** – Plans are typically prepared in a computerized format called ".dwg". Bid Manager's architectural interface must provide for simple project set-up and administration by the architect. Architects will not allow their .dwg files to be publicly disseminated. Painless file conversion will be required for the following critical purposes:
        1. Painless viewing while on-line
        2. Downloading for electronic estimating
        3. Downloading for digital printing

        Individual plan sheets must be organized in folders by consultant discipline as follows:
        1. Architectural
        2. Structural
        3. Plumbing
        4. Mechanical/HVAC
        5. Electrical
        6. Landscape
        7. Civil
        8. Other

        Note: If plans are not available in electronic format all efforts should be made to link the designated printer to the bid team for easy ordering of bid documents.

    b. **Specifications** – Specification books are typically prepared in an electronic word processing program. All specification booklets will be converted to .pdf file format and organized by the industry standard UCI/CSI major division codes as follows:

        01 – General Requirements
        02 – Site Work*
        03 – Concrete
        04 – Masonry
        05 – Metals

06 – Woods and Plastics
07 – Thermal and Moisture Protection
08 – Doors and Windows
09 – Finishes
10 – Specialties
11 – Equipment
12 – Furnishings
13 – Special Construction
14 – Conveying Systems
15 – Mechanical
16 – Electrical
17 – Other

* Note: Soils report documents will be contained within division 02 – Site Work

c. **Addenda** – Addenda must be treated as "Urgent" documents throughout the architecture. Addenda change bid dates, bid documents and bid meetings on a regular basis. Accurate bid submission is contingent on timely receipt of addenda information. A separate and distinct folder will house all addenda information and will be organized as follows:

- Addenda
    - Addenda 1 — March 23, 1999
        - Plans
        - Specs
    - Addenda 2 — April 2, 1999
        - Plans
        - Specs

Indexing all addenda information into a search index would greatly enhance the industry addenda processing problems. (Key word match and group by major CSI division) E-mail and paging services should be linked to the addenda processing system.

3. **Other Correspondence** – Architects and Engineers will require other basic tools for standard bid collaboration. The action list below represents a preliminary list that may change as feedback is received from beta testers:

    a. RFI Processing – RFI's or Request for Information correspondence is critical during the bid phase. General contractors often receive questions from qualified subcontractors regarding product specifications, installation details and/or alternate material submission. RFI's typically create addenda. Addenda legally modify the bid documents. The RFI processor is a simple word processing tool that automatically tracks and forwards information to the correct team menders – similar to Project Net's Submittal Processing system.
    b. Alternate Product Inquiry – Building Product Manufactures often submit requests for alternate materials when their product names are not listed in the specification book. Architects need an organized submission vehicle and a simple form of approval processing. HTML linking within the inquiry to the BPM's web site may greatly enhance this process.
    c. Pre-Bid Meeting Notification – Some projects require a pre-bid conference with the architect and the owner. Home Depot never bids a job without a pre-bid conference.
    d. Electronic Bid Submission – Most bids are submitted in person today; however, Bid Manager may modify this protocol. For this reason the system must support

electronically submitted bids. The architect will want to create a bid form so that all the bids are consistent and easily evaluated. Contractors will simply fill in the blanks and click on SUBMIT BID NOW. The "submit bid now" screen would look nice with an analog clock in the corner!

   e. Bid Withdrawal Form – Contractors often withdrawal from the bid process. A form with predefined reasons for the withdrawal will be helpful to notify all involved in the bid process to-date.
   f. E-mail – We may want to provide free e-mail services.

The Print Network

A key ingredient for Bid Manager's success is the ability to process comprehensive reproduction services for plans and specifications. In a perfect world the architect will submit plans and specifications in formats that can be painlessly converted to printable images as outlined above. A significant portion of Bid Manager's e-commerce plan is to link digitally enabled printers to the audiences requiring hard copy plans and specifications. The print processing network should be designed as follows:

1. Utilizing the document organization structure shown above, the ordering system must allow picking and choosing of individual plan sheets and specification sections. Use "Add to shopping cart" methodology. Each set of bid documents must be packaged and re-capped by job title.
2. Provide for "frequent flyer" purchasing and/or large order discounts.
3. Provide comprehensive ordering, fulfillment and billing system. (Fed-x partnering?)
4. Potential for automatic profiled delivery system. (Painting sub wants Architectural sheets and section 09900 of the specifications delivered each week within a designated geographic location)

The General Contractor (GC)

The GC is responsible for providing an all-inclusive turnkey bid for the project. GC's are bound to their bid by language contained within the bid documents. The challenge for the GC is to get as many competitive bids as possible from qualified subcontractors and suppliers before the 2:00 PM deadline. Bid Manager will greatly enhance the GC's competitive capabilities by providing the following basic services:

1. Search for, or automatically receive, new bidding opportunities
2. Organizing and tracking a list of pre-qualified subs and suppliers
3. Access to hundreds of thousands of subs and suppliers that are organized by UCI/CSI trade codes
4. Automated fax and e-mail bid solicitation to subs and suppliers
5. Automated bid response from subs and suppliers
6. Automated print processing of plans and specifications from print network
7. Quick and simple RFI submission to architects and engineers
8. Speedy notification and delivery of addenda information
9. Easy processing of "Scope Letters", "Bid Memos" and "Bid Submission Forms" to team bidders
10. "Work from Anywhere" bid collaboration platform
11. Electronic bid submission from subcontractors and suppliers
12. Electron bid submission to Architects
13. Historical tracking and 24 hr. monitoring of bid process
14. Multi station bid processing within one seamless platform
15. Automated purchasing and award notification (contract processing)
16. Easy transition to "Web-based Project Management"

Following is a brief description of how each of the above features will function within the Bid Manager environment:

1. <u>Search for, or automatically receive, new bidding opportunities (marketing)</u>
    - a GC's will utilize the "Project Data" as entered by the architect to find new bidding opportunities. Locating all industrial tilt-up bidding opportunities in a geographic region is one example of this valuable search benefit.
    - b Many GC's will pay for Bid Manager to automatically deliver bidding opportunities based on pre-defined criteria. GC's can retrieve the data at any time while the system updates the mailbox, as new data becomes available.
    - c After the project list is drilled down the GC will want to deliver a "Request to Bid" inquiry to either the architect or owner. This may become a form letter within Bid Manager.
    - d A simple project tracking and calendar system will help GC's track and manage their bidding opportunities.
2. <u>Organizing and tracking a list of pre-qualified subs and suppliers</u>
    - a. GC's will want to maintain and track their own private list of subs and suppliers. Bid Manager's database structure should allow GC's to manipulate and manage two sets of intelligent data. Subs and suppliers should also be capable of updating the profile directly, only if the GC's admin preferences are set accordingly.
    - b. The database structure will mimic a typical contact management database, but will be uniquely organized by the UCI/CSI code indexing system. A one-to-many relationship must be available for subs and suppliers that perform more than one trade.
    - c. Standard report writing should be provided for creation of printed lists.
    - d. Basic import and export capabilities must be supported for easy set-up of the bidder list.
3. <u>Access to hundreds of thousands of subs and suppliers that are organized by UCI/CSI trade codes</u>
    - a. This will be a major benefit of Bid Manager's product offering. GC's will use this data as a supplement to their private database of subs and suppliers. Similar to section 2 above, all data will be organized by the UCI/CSI index of codes and will be managed in a typical contact management database environment unique to construction bidding.
    - b. GC's must have the capability of moving data from the public list to their own private list. A distinction between the origin of data must be provided prior to adding to private list.
    - c. Subs and suppliers that pay for advertising will be listed in "Top-of-List" priority for easy selection by the GC.
    - d. General use fax and e-mail templates should allow quick and easy communications directly from the private or public list of subs and suppliers.
4. <u>Automated fax and e-mail bid solicitation to subs and suppliers</u>
    - a. The Bid Management capabilities of Bid Manager will become the heart of the product. GC's will need to organize a bid list quickly and notify qualified subs and suppliers by fax and e-mail.
    - b. Each project must be organized as its own entity. Many projects will be set-up by the owner or architect and forwarded to the GC for bid processing. Not all projects will be set up by the architect. GC's will use Bid Manager without electronic plans and specs.
    - c. All bids will be organized by UCI/CSI code indexing. Filtering out subs and suppliers by fields representing geographic bidding preferences will be supported. Locating subs with labor and other work preferences will also be required.
    - d. A point and click selection process will allow the GC to narrow don a preferred list of subs and suppliers.
    - e. Templates will enable quick and simple broadcast fax and e-mail processing.
    - f. Printed reports will facilitate the requirements of hard copy documentation.
    - g. Non bid related faxes and e-mails must be permitted within the system.

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   - h. A 1-800-fax response server will be used to automatically rout RSVP's back to the appropriate GC. OCR recognition capabilities will be required for fax routing.
   - i. GC's will require bid solicitation activity reports showing bid coverage by UCI/CSI trade. If bid response is low additional faxes and e-mails will be sent to subs and suppliers selected from the public list.
   - j. Proof of "Good Faith" solicitation to qualified minorities, women, disadvantaged veterans and small business may be required on certain public works bids.
5. <u>Automated print processing of plans and specifications from print network</u>
   - a. Over $2.0 billion is spent each year on reproducing bid documents. Fed-x collects over $300 Million from shipping plans in tubes. Bid Manager will greatly enhance the printing and decimation process. GC's must have the capability of pre-purchasing plans for a select group of subs and suppliers. All other interested subs and suppliers must directly purchase from the printer. Pre-purchased plan information is not for public use.
   - b. GC's will want to submit an order to several vendors to obtain the best possible printing price.
   - c. The bid document-ordering module should be a unique feature of the interface – easy-to-use and reliable.
6. Quick and simple RFI submission to architects and engineers
   - a. GC's will need a simple template to create, submit and tract questions submitted to architects and engineers.
   - b. Utilize pull-down lists make RFI's easy to prepare and send.
   - c. Some of the RFI's will be directly forwarded to the architect as they come in from the subs and suppliers. Admin preferences should allow automatic forwarding with copies in the GC's inbox.
   - d. History tracking will be required.
7. Speedy notification and delivery of addenda information
   - a. The average bid experiences 5 addenda prior to bid day. Some projects will have 50 to 100 addenda. Addenda consist of revised bid dates, modified plans and specs, and adjusted meeting dates and times.
   - b. All addenda information will be housed in a separate folder called "Addenda" with sub folders called "Plans" and "Specs".
   - c. Special fields will be provided to capture modified bid dates or meeting dates. Other buttons may be used to signify changed plans or spec sections.
   - d. A key-word index can be used for automatic notification or search inquiry of trades affected by the addenda.
   - e. Addenda are typically labeled 1-N or A-Z.
   - f. All electronic bid submission templates should note receipt of addenda, i.e. This bid includes the following addenda…1, 2, 3 and 4.
8. Easy processing of "Scope Letters", "Bid Memos" and "Bid Submission Forms" to team bidders
   - a. GC's will use templates to organize questions and broadcast them to certain members of the bid team. This feature will help maintain, and possibly increase the GC's competitive edge.
   - b. All templates are UCI/CSI code driven – pull down list of codes.
   - c. Uses pull-down list of bid team based on selected codes for memo or scope letter.
   - d. Will need to fax and e-mail forms, similar to bid solicitation.
   - e. Unique folders house responses from subs and suppliers.
9. "Work from Anywhere" bid collaboration platform
   - a. Bid set-up stuff! Not complete yet! **************************
10. Electronic bid submission from subcontractors and suppliers
    - a. GC's will receive bids from subs and suppliers. Allowing the GC to prepare a custom bid form for each bid will help facilitate a consistent retrieval and bid evaluation process.
    - b. Many subs and suppliers will use a standard e-mail attachment protocol for submitting bid proposals. (Attach an Excel or Word file)
    - c. Subs and suppliers will want verification that the bid was delivered successfully.
11. Electron bid submission to Architects

   a. Architects may want to prepare bid forms that can be submitted by the GC. GC's can fill in the blanks, add information and submit the bid via Bid Manager.

12. <u>Historical tracking and 24 hr. monitoring of bid process</u>
13. <u>Multi station bid processing within one seamless platform</u>
    a. Large projects often require the efforts of several employees. Bid Manager should allow real-time access by to all levels of the application.
    b. Standard AIA contract documents control 90% of the industry's agreements. Automating this piece of the business will require creativity and vision.
14. <u>Automated purchasing and award notification (contract processing)</u>
    a. After a bid is awarded GC's will need to lock-in material prices. Bid Manager should provide a simple contract purchasing and award processing system. This system will ultimately drive most of Bid Manager's future revenue.
15. <u>Easy transition to a standard project management package (Primavera, Meridian Systems, etc)</u>
    a. If a bid team utilizes Bid Manager to win a bid they will be highly motivated to continue the construction management process in a similar environment.

Subcontractors

It is important to understand that the subcontractor is the lifeblood of the general contractor. Deep relationships are nurtured and maintained in order to combat heavy bid competition. Bid Manager will flourish if the subs can enhance their bonds with the GC. The framers of Bid Manager must incorporate the ability to collaborate in an environment that is easy to use and highly secured.

While some of the more sophisticated subs will perform similar functions as the GC, the vast majority will expect the following capabilities:

1. Search for, or automatically receive new bidding opportunities
    a. Searching by using one or more of the following criteria will be required (including Boolean logic):
        1. UCI/CSI trade
        2. Key word(s)
        3. Project type (commercial, schools, retail, etc.)
        4. Geographic Location
        5. Valuation
        6. # of Days before bid is due
    b. Set preferences and have data automatically delivered to bid inbox
    c. Manage bidding opportunities in a calendar package similar to or linked to Outlook
    d. Directory services activity automatically sent to sub
    e. Directory services link to sub's web site
    f. Creation of a custom portal for the sub
        1. Marketing and promotion
        2. Manage relationships with BPM's

Suppliers, Wholesalers and Building Product Manufactures

One of the greatest challenges for the BPM segment is locating new projects during the design phase. As the Bid Manager piece becomes more populated with data the BPM will see great value in having access to the information. The BPM segment will require the following capabilities:

1. Same as sub above, and...
2. Receiving e-mail and fax leads from subs and G.C.'s

3. Sending quotes and/or bids to subs and G.C.'s
4. Locating projects containing their own products or the requirement for similar products
5. Hot-linking anyone to the BPM web site
6. Creation of a custom bid portal that meets Bid Manager standards for future e-commerce

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P1056PROV

ATTACHMENT F

PROJECT DEVELOPMENT & MANUAL

logical -E
Primix Solutions, Inc.
Requirements Week Review & Bid Manager Proposal
CONVEX Technologies, Inc.

July 5th, 1999

PRIMIX solutions

One Arsenal Marketplace Watertown, MA 02472
(617) 923-6805 fax (617) 923-5267

Engagement Contacts: Bernie Snow & Markham Tate

Table of Contents

1.0 Executive Overview

1.1 Proposal Overview

This proposal outlines the requirements and approach required to design and implement Phase 1 of the Convex Bid Manager. Additionally, the proposal presents a review of the Requirements Definition Workshop conducted by logical-E and Primix. The results of the Requirements Definition Workshop form the basis for this proposal. Additional activities undertaken by logical-E and Primix since the completion of the workshop are also reflected in the proposal.

1.2 Review of Requirements Definition Week

During the week of June 22-26,1999, representatives from logical-E and Primix met with Larry Wares, CEO of Convex, to define the requirements for the proposed web-based system that, when completed, has the potential to transform the construction industry. The objectives of the Requirements Definition Week were as follows.

- Develop a comprehensive set of functional requirements for Phase 1 of the Convex web-based project
- Identify a set of high-level functional requirements for Phase 2 & 3 of the Convex web-based project
- Develop approximately 4-6 'mock-up' pages, based on functional requirements identified early in the week, to demonstrate the preliminary look and feel of the web site
- Develop a catalog of the required Phase 1 web pages
- Develop an initial enterprise web architecture strategy and database design
- Develop an initial Phase 1 project plan and budget estimate

An interactive format was utilized throughout the week that enabled meaningful dialogue to take place between the participants. The overall vision for the web-site was presented by Mr. Wares and a variety of topics including the web site's user interface, the system architecture and database, hardware requirements, system performance, and security issues were discussed. A considerable amount of time was spent clarifying the respective scope for each of the initial three phases. The description of the initial three phases that follow represent our summary understanding of what will be required in each phase as the project moves forward.

The outputs associated with each of the workshop's objectives can be found in respective sections of the proposal. All of the participants from logical-E and Primix would like to express their gratitude to Mr. Wares for the amount of time and energy he brought to the workshop and look forward to the opportunity of working with him in the future.

1.3 Project Description

Phase 1

The initial phase of the Bid Manager project will focus on the creation of a web-based system that will transform the current pre-construction bid practices into a more efficient and cost effective process. The objective for Phase 1 is to go to market as quickly as possible with a robust, scaleable, and easy to use web site that meets the needs of key stakeholders. The Phase 1 functionality focuses heavily on messaging and document management but it is essential that Bid Manager be designed and built with subsequent phases in mind given the product's ultimate movement into the electronic commerce marketplace. The primary stakeholder groups targeted in Phase 1 are the General Contractors and Subcontractors although the site will be made available to other stakeholder groups, particularly Architects and Engineers. The functionality in Phase 1 will be developed to not only capture 'eyeballs' but also to provide real value in reducing the level of effort required to develop, manage, and submit bids. The ability of Phase 1 to entice General Contractors and Subcontractors to keep returning to the site is critical to the overall success of Bid Manager as it moves forward into the additional functionality to be delivered in subsequent phases. The implementation date for Bid Manager Phase 1 is 4th quarter of 1999.

Phase 2

Bid Manager Phase 2 includes the networking of over 1,200 blueprinters for the hard copy reproduction of bid documents. The overall depth of the Phase 2 functionality is yet to be determined but, at a minimum, Bid Manager's messaging backbone will be utilized to notify participating blueprinters of requests for documents. Another consideration for Phase 2 will be the status of the proposed alliance between Convex and Autodesk. If this alliance moves forward, it is possible that a portion of Phase 2 scope could include the electronic movement of plans and drawings through Bid Manager. This step is seen as critical to the overall vision for Bid Manager given the proposed functionality planned for Phase 3.

Phase 3

Bid Manager Phase 3 will deal with the full integration of the construction industry supply chain in that several key linkages will be made which will transform the industry as it currently stands. Phase 3 is still in the planning stages but there is the possibility that it will run concurrently with Phases 1 & 2. The key elements of Phase 3 involve the linkage of electronic plans and specifications (.dwg format) to Bill of

Materials associated with the specific materials which match the requirements outlined in the plans and specifications. These Bill of Materials can then be used to build on line orders through the use of on-line material and supply catalogs. The ability to link electronic plans and specifications with specific Bill of Materials that can then be electronically ordered would transform the construction industry by dramatically increasing the efficiency and effectiveness of the overall process.

1.4 Project Plan

The Scope runs from a proposed start date of 7/19/99 to 7/23/99. The outcome of this week would be the functionality matrix and consensus regarding the features and functionality if Phase One that we can deliver by the desired date. The design phase will begin on 7/26/99 immediately following the scoping session. We are allocating 5 weeks for design however will attempt to complete this in 4 weeks. In order to meet the aggressive overall timeframe it is suggested that the revised development plan be delivered by 8/20/99.

The Project design team will work at the CONVEX Technologies site for the UI Design Phase. We anticipate that the entire design team will require six (6) consultants.

1.4.1 Milestones

Milestones are key points in a project where demonstrable progress can be seen. The suggested milestones for the Scope & Design Phase are given in the following table.

Milestone	Date Due
Scope Start	7/19/99
Scope Completion with Functionality Matrix	7/23/99
Design Start	7/26/99
Delivery of functional sections for review	7/13/99
Delivery of Interface Simulation	7/13/99
Delivery of revised development plan	8/20/99
Delivery completed design for review	8/27/99

1.4.2 Deliverables

There are three deliverables to CONVEX Technologies at the end of the Design Phase. These are the Design Document, the mock up (Interface Simulation), and a revised development plan.

The Design Document will be delivered in two installments. The first installment will consist of the functional sections. A mock up of the screens will also be delivered. Together the first sections and the mock up comprise the functional baseline for the Phase One system. A complete Design Document will be delivered after the technical design. In addition a revised development plan will be provided to CONVEX.

This Phase will be comprised of the functionality matrix design/approval process and Bid Manager's functional design and the technical design. The purpose of this phase is to finalize the detail of the required screen layout and supporting functionality. Primix and logical-E determined that the effort required to complete this process will require five (5) weeks, seven (7) consulting skill-sets to cover the required range of technical disciplines, a Client Partner and additional intermittent personnel support as required to deliver specific core expertise. Deliverables provided at the end of this phase will include the Design Document, consisting of the functional and technical specifications, the screen mock-ups, and a detailed development plan. As mentioned above, a delivery from Design will be a Fixed-Time/Fixed-Cost bid for Bid Manager's Development Phases. Per CONVEX's direction, Primix and logical-E anticipate beginning the Design Phase on Monday, July 19th. Primix and logical-E will deliver the complete Design Phase for a fixed price of $291,000.

1.5 Development Phase Project Plan

1.5.1 Schedule

In essence, the development runs from a proposed start date of 9/6/99 to delivery of the system-tested application on 11/26/99.

1.5.2 Milestones

The suggested milestones for the Development Phase are:

Milestone	Date Due
Development Start	9/7/99
Software and Hardware Setup	9/13/99
Completion of Implementation	11/5/99
Completion of Integration testing	11/12/98
Completion of System Testing	11/26/99

The hardware requirements will be finalized two weeks from the official start date. It is expected that the hardware be available for the start of development.

1.6 Best-Estimate Price for Development

The Development Phase is comprised of the implementation and integration stages. The purpose of this phase is to take the detailed technical and functional designs that evolved from the Design Phase to build unit tested coded components. These units will then be integrated and tested before being deployed. Our current best-estimate range for Bid Manager's Development Phase is $800,000 to $1,200,000. Once again, a Fixed-Time/Fixed-Cost proposal for the Development Phase will be delivered upon completion of the Design Phase.

2.0 Functional Requirements

2.1 CONVEX Bid Manager Project Summary Overview-Phase 1

The initial phase of the Bid Manager project will focus on the creation of a web-based system that will transform the current pre-construction bid practices into a more efficient and cost effective process. The objective for Phase 1 is to go to market as quickly as possible with a robust, scaleable, and easy to use web site that meets the needs of key stakeholders. The primary stakeholder groups targeted in Phase 1 are the General Contractors and Subcontractors although the site will be made available to other stakeholder groups, particularly Architects and Engineers. The functionality in Phase 1 will be developed to not only capture 'eyeballs' but also to provide real value in reducing the level of effort required to develop, manage, and submit bids. The ability of Phase 1 to entice General Contractors and Subcontractors to keep returning to the site is critical to the overall success of Bid Manager as it moves forward into the additional functionality to be delivered in subsequent phases. The implementation date for Bid Manager Phase 1 is early 4th quarter of 1999.

2.2 Public Database

- Design and implement a robust and scaleable database to serve as the central repository for approximately 1.5 million records. (See entity relationship diagram in Architecture section of proposal)

- Design overall functionality with 'ease of use' as a primary objective. This includes the use of intuitive screens, drop down menus, point and click buttons, and, where possible, maps or other illustrative mechanisms for areas such as selection of geographic preferences.

- Provide for publication of Public Works (City/State/Federal) projects, which by definition are open to anyone and everyone, that qualifies to bid.

- Provide segmentation of the 1.5 million records across the following categories.

    - Owners
    - Architects & Engineers
    - General Contractors
    - Subcontractors

  - Blueprinters
  - Suppliers & Wholesalers
  - Building Product Manufacturers
  - Other Stakeholder Groups as Required

- Provide segmentation for General Contractors and Subcontractors to self-select into one or more Uniform Construction Index (UCI)/Construction Services Institute (CSI) codes. The seventeen major UCI/CSI codes are listed below. The complete set of sub-codes inside each of these seventeen major codes are on file.

01	General Requirements
02	Sitework
03	Concrete
04	Masonry
05	Metals
06	Wood
07	Thermal
08	Doors
09	Finishes
10	Specialties
11	Equipment
12	Appliances
13	Pre Engineered Buildings
14	Conveying
15	Mechanical
16	Electrical
17	User Defined

- Provide the capability for user defined UCI/CSI codes for both the public database and private portals.

- Provide a three level database service for all stakeholder groups, most notably Subcontractors, that comprise over half of the total population. The three levels are as follows:

01 Bronze – A free database listing of approximately 20-25 data fields that includes:

Company Name
Work phone
Contact 1

60178825.012800

Contact 2
Work fax
Mobile phone
Pager
E-Mail
Web Site
Address 1
Address 2
City
State
Zip Code
Bid Range – Min/Max
Labor (Union, Open Shop, Open Shop/Prevailing Wage)
Special Category (Minority, Women, Disadvantaged, Veteran)
Trades (UCI/CSI)
Geographic Preference
Work Type (eg, Schools, Industrial, Retail)
Trade Cross-Reference (Associate master UCI/CSI with self-defined)
User Fields (5)

02 Silver- A pay level 1 (fee TBD) of additional information that will enable automated due-diligence to be performed. The silver listing data fields include:

Bonding & Insurance Information (Capacity, Agent, Rating)
Annual sales volume
Number of employees
Officer contacts (3)
Marketing contacts (2)
Financial contacts (2)
Field contacts (2)
Emergency contacts (3)
Credit History
Project References (TBD)
Business References (5)
Convex Rating (TBD)

03 Gold – A pay level 2 (fee TBD) whereby Convex will develop custom web pages for individual subscribers.

- Provide full public database search capabilities on all data fields listed above.

- Provide an inverse load when General Contractors are selecting potential subcontractors from the public database so that Gold members appear at the top of the search results, followed by Silver members, then Bronze. This inverse load will be required for both full searches and segmented searches (eg, geographic location).

- Prevent the downloading of the public database to protect against copyright infringements.

2.3 Private Portals

- Provide secure private portals for stakeholders, particularly General Contractors for the purpose of effectively and efficiently managing individual bids (projects) and subcontractors. Security will be developed through use of User ID's and passwords.

- Provide General Contractors with the following functionality inside their private portals.

    - Ability to electronically receive new bids (projects) from Architects using Bid Manager.

    - Ability to organize bid by different bid types. The 5 primary bid types are as follows.

        - Public Works
        - Private Competitive
        - Negotiated
        - Design/Build
        - Re-Bid

- Ability to create new projects for bids they will be responding to.

- Ability to maintain inside their private portal a directory of their preferred subcontractors.

- Ability to search the public database and populate their private portal with additional subcontractors they wish to add to their private directory.

- Ability to search their private portal with the same multi-dimensional search capabilities

- Ability to select UCI/CSI codes for various bid components.

- Ability to match subcontractors with respective UCI/CSI codes and build lists of multiple subcontractors to individual codes to ensure adequate bid coverage.

- Ability to create new codes outside of the standard UCI/CSI master set.

- Ability to electronically submit Invitations to Bid to the selected subcontractors for each project.

- Ability to electronically receive bids from subcontractors.

- Ability to electronically submit bid responses to architects.

- Ability to create and electronically submit and receive additional supporting documents related to individual projects. These documents include:

    - Addenda- High priority items that include information directly related to individual projects that require immediate attention.

    - Scope Memos – Documents that signify some alteration to the original project.

    - Request For Information – Documents sent to various stakeholders that ask for clarification or additional information.

    - General Memos – Documents of a general nature that may be related to individual projects or to more generic topics.

    - Bid Withdrawal Form – Document that indicate that either a General Contractor or Subcontractor is withdrawing from the bid process.

    - Other – Additional document types may be defined as the development of Phase 1 progresses.

- Provide an easy to use and flexible directory/folder based capability for organizing and managing projects and associated documents.

- Provide an import mechanism from the public database to individual private portals for the purpose of populating private portals with new subcontractors or refreshing data on existing subcontractors already included in the private portal.

- Provide private portals with the ability to create new subcontractors independent of the public database to accommodate general contractors who use subcontractors that do not participate in the public database.

- Provide a variety of templates for the processing of projects and supporting documents. The required templates include the following.

  - Project Initiation- This template will be used by Architects and General Contractors to create a new project based on receipt of an individual bid package. Information will include, but may not be limited to the following:

    - Project ID
    - Project Title
    - Location
    - Bid Date and Time
    - Owner Information
    - Architect Information
    - Consultant Information
    - General Contractor Bidding Information
    - Project Type (25)
    - Estimated Valuation
    - General Scope of Work Description (Text)
    - UCI/CSI List of Trades (Or Key Word Index)

  - Standard Bid Response Form – A standardized template for Subcontractors to respond to individual bids. This template will use the Project Initiation template as the basis and additional data fields will include, but may not be limited to:

    - Subcontractor ID
    - Subcontractor Name
    - UCI/CSI Bid Coverage
    - Total Bid $

  - Additional templates will be required for each of the following items to enable ease of use and consistency of data entry. Again, the data fields included in the Project Initiation template will be used as the starting point for each template. A general text section will be included in each template.

- Addenda
- Scope
- Request For Information
- General Memos
- Bid Withdrawal

- Other – Additional document types may be defined as the development of Phase 1 progresses. As such, it may be determined that templates for these other documents may be required.

2.4 Registration

- Provide all participants with an easy to use initial registration process that includes a User ID and initial password.
- Prevent participants from logging on to the system until they have completed the initial registration process.
- Provide 'point and click', drop down pick lists, and other methods to facilitate ease of data entry.
- Use a phased registration process that provides the free Bronze Listing registration process and follow that with a marketing prompt to illicit interest in the Silver and Gold subscription services.
- Provide on-line credit card capability for participants registering for subscription services.
- Provide an initial e-mail and/or fax to all participants upon initial registration welcoming them to the site.
- Provide an e-mail and/or fax to the participant signing up for Gold Listing that a Convex representative will be contacting them regarding their web page. Additionally, provide an e-mail to the appropriate Convex representative that a new Gold Listing member has signed up.
- Provide for automatic renewal of annual subscription services.

2.5 Log On

- Ensure that all participants have a system authorized User ID and password.
- Ensure that a simple, easy to use and maintain process is in place for users needing User ID or password assistance. If feasible, an on line system prompt could be utilized. If this proves unworkable, Convex will need to consider this requirement as part of its on-going system maintenance process.

2.6 Initial Database Population

The public database will initially be populated using a combination of electronic upload from one or more industry listings and manual data entry. All stakeholders will be entered into the database with all relevant and available data fields populated. It is highly likely that the manual data cleanup and entry will be performed offshore. As such, close coordination between the Phase 1 Project Team and the offshore entity performing this task will be required. The Project Team will be responsible for providing database design layouts and, ultimately, access to the actual database once it is created. Sample data sheets should be fed into the database early in the process to ensure that the data being entered is consistent with the overall database design. As such, the master data set for the public domain will be, in all likelihood, built using an iterative process.

Upon completion of the master public database, and upon implementation of the Phase 1 system, it is proposed that a one-time e-mail and fax activity be conducted that will notify each of the database entries about the implementation of Bid Manager. A marketing piece will be incorporated into this notification and individuals will be encouraged to visit the site and register. The possibility of developing system generated User ID's and passwords will be explored. The notification process could be repeated if desired.

3.0 Preliminary System Recommendations

3.1 Graphical User Interface

This section deals with the approach to be used for the design and development of the Graphical User Interface (GUI) and also presents a high level workflow of web pages. Four sample Bid Manager home pages are also included for review and input.

Our overall objective with respect to the user interface is to build a persuasive IT solution for Convex and its user population. We will use rational and emotional techniques to move users to know, feel and do what it takes to deliver business results to the client. We bring to each project:

- Insight and intuition to the heart and mind of the user
- Big Ideas
- Objective excellence in design and copy execution
- Functional form
- Leverage of Brand equity

The creative process takes place in the span of 3 to 5 weeks. It starts with the sign off of a creative brief that outlines the goals and objectives of the project, as well as the functionality matrix documents which defines all the functionality and content that the site will contain.

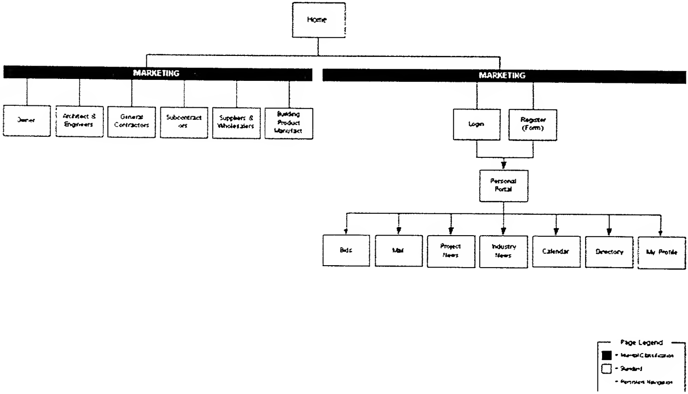
The first step is the information architecture (page flow) development. This phase usually occurs during the first week. Some initial work has already been completed in this area. The page flow will enable the designer to establish persistent, primary and secondary navigation. This is also important in determining how certain areas within each page will need to be graphically treated by placing the right emphasis on the most relevant information.

After the page flow and the overall home page concept have been approved, the designers will start to develop more detailed designs for the site. Additional key pages will be developed in a static format (only graphics, no HTML), this initial design development takes place in approximately 10 days.

At the end of the 10 days, we will formally present 2 to 3 additional design concepts for review and feedback. Once the final design direction is selected, the second phase of creative will take place. At this point the feedback from the initial design presentation will be incorporated into the selected design as well as all other changes pertaining to functionality and navigation requirements. This step is usually performed in a week, depending on the amount of changes being performed. At this point a second formal presentation will take place to review the revised creative. If additional feedback is received, one more week or more, depending on amount of changes, will be added to the creative cycle to incorporate all these additional changes.

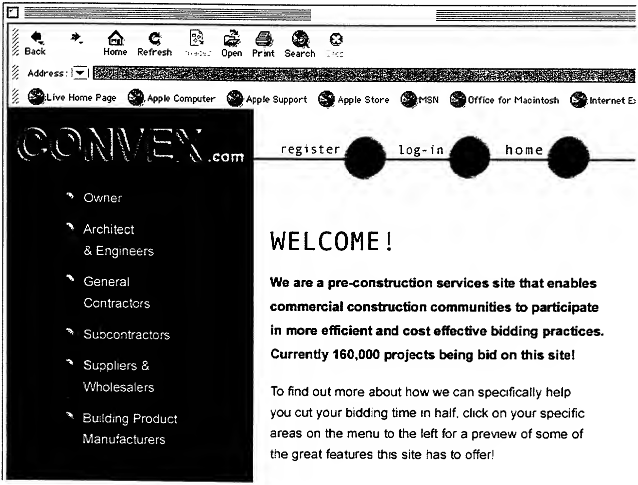
A third and final presentation will take place to ensure that all changes from previous meeting have been incorporated. If no additional changes are required, the final creative will be signed off.

High Level Flow



Sample Bid Manager Home Pages

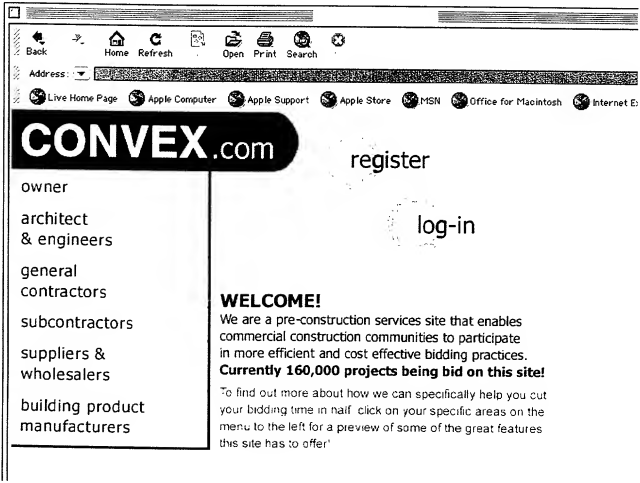
On the following four pages, sample Bid Manager Home Pages are included for review and input. These pages have been designed based on discussions conducted during the Requirements Week as well as additional dialogue that has taken place since that time.



WELCOME!

We are a pre-construction services site that enables commercial construction communities to participate in more efficient and cost effective bidding practices. Currently 160,000 projects being bid on this site!

To find out more about how we can specifically help you cut your bidding time in half, click on your specific areas on the menu to the left for a preview of some of the great features this site has to offer!



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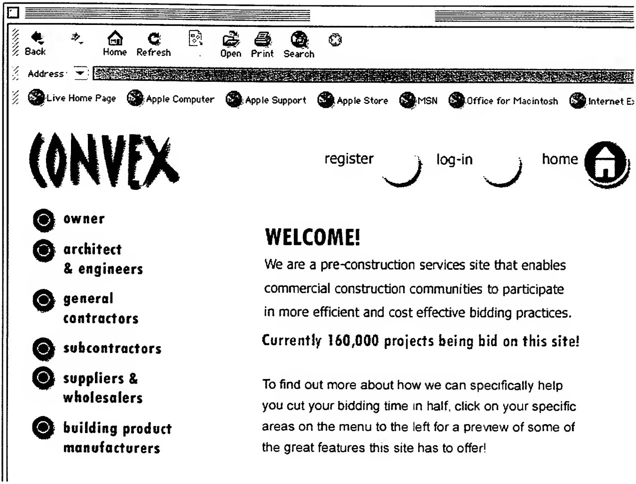

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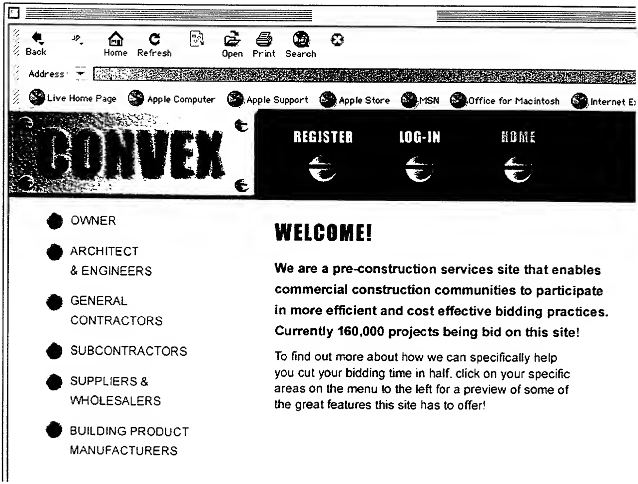

- OWNER
- ARCHITECT & ENGINEERS
- GENERAL CONTRACTORS
- SUBCONTRACTORS
- SUPPLIERS & WHOLESALERS
- BUILDING PRODUCT MANUFACTURERS

WELCOME!

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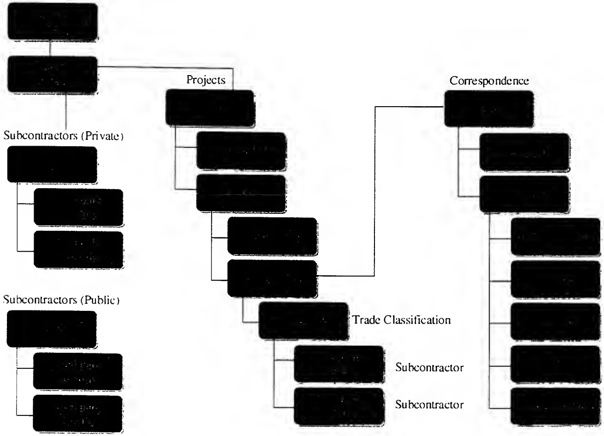
The diagram ~~above~~ Below illustrates the object hierarchy that relates to the system domain functionality. It depicts the types of objects (called classes of objects) in the system. There would, of course, be multiple instances of many of the objects. This diagram shows what is called the object inheritance relationships. For example, a General Contractor object is a type of Company object, which in turn is a type of Entity object. The General Contractor is said to inherit from the Company object. This means that the Company object will have certain data and functionality that will be available to all of its subclasses, such as General Contractor. In this manner, a specific piece of functionality will only show up once in the system but will be shared by all objects that need to use it. In addition to the objects shown here, there will be several significant utility objects, such as e-mail and fax objects.

Please note that the majority of the hierarchy is taken up by documents and companies.

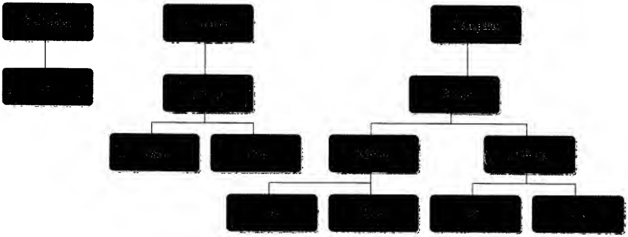
3.2.1.2 General Contractor



This diagram above uses a General Contractor (G.C.) as an example of how a primary actor object functions. In contrast to the object hierarchy, which shows static relationships, this diagram illustrates dynamic relationships at runtime. It shows all of the objects that a G.C. would be connected to. Note that there is no connection between a G.C. and the public list of Subcontractors (S.C.s). Page logic would allow a G.C. user to take company listings out of the public list and put them into the G.C.'s private list, or into a specific G.C. project.

3.2.1.3 Security Object Relationships

This diagram below shows how the three objects used for security interact. The Company objects would be replaced in the real world with instances of specific sub-classes, such as G.C. and S.C. objects.



3.2.2 Object Descriptions

Object Name	Description	Knows About
Addendum	This document contains information relating to official changes in the bid.	No other objects

Object Name	Description	Knows About
Architect	This primary actor has information and functionality specific to an Architecture company.	Its private list of G.C.s Its list of projects

Object Name	Description	Knows About
Category	This is a List that has a name associated with it. It can function in a variety of settings like a folder or directory does in an operating system.	Its contents

Object Name	Description	Knows About
Classification	This contains the basic qualities of a reference to a particular item, such as a code and a description.	No other objects

Object Name	Description	Knows About
Company	This represents a registered company in the system, and has the ability to store private lists of company listings, and to massage them into smaller sets.	Its corresponding Company Listing. Its private list of companies.

Object Name	Description	Knows About
Company Listing	This records the most basic information on a company for all registered and unregistered companies.	Its corresponding specific type of company object if this company is registered.

Object Name	Description	Knows About
Correspondence	This is a general piece of correspondence.	No other objects

Object Name	Description	Knows About
Document	This is an abstract class that represents the most basic qualities of all documents in the system.	No other objects

Object Name	Description	Knows About
Engineer	This primary actor has information and functionality specific to an Engineering company.	Its private list of G.C.s Its list of projects.

Object Name	Description	Knows About
Entity	This is an abstract class that represents a user of the system, or an agregrate of users.	Any sub entities that it contains

Object Name	Description	Knows About
Feedback	This is a document used in the customer satisfaction section of the system.	No other objects

Object Name	Description	Knows About
General Contractor	This primary actor has information and functionality specific to a General Contractor company.	Its private list of S.C.s Its list of projects.

Object Name	Description	Knows About
Geographical	This refers to a geographical location, such as a county or state.	No other objects

Object Name	Description	Knows About
Group	This is an aggregation of users of the system for the purposes of security and sharing of information. A group may represent a department or office in a larger company.	No other objects

Object Name	Description	Knows About
Invitation To Bid	This is a document that details an invitation to certain parties to bid on a project.	No other objects

Object Name	Description	Knows About
List	This has the ability to contain an ordered set of other objects.	Its contents

Object Name	Description	Knows About
Material	This refers to a particular building material.	No other objects

Object Name	Description	Knows About
News Article	This document contains news information. This could be project or industry news.	No other objects

Object Name	Description	Knows About
Object	This is an abstract object that is the root of all other objects in the system. It contains	No other objects

	the basic qualities that make an object an object.	

Object Name	Description	Knows About
Owner	This primary actor has information and functionality specific to an Engineering company.	Its list of projects

Object Name	Description	Knows About
Plan	This unstructured document represents the basic plan for a project.	No other objects

Object Name	Description	Knows About
Project	This abstract class organizes the basic data and functionality of a project. This takes the trade classifications and company listings that they contain and uses them to send out documents to lists of recipients.	Its correspondence. Its trade classifications, each of which contains company listings.

Object Name	Description	Knows About
Project – Architect	This project type will be created automatically for all projects when the initiating company is an Architect.	Its list of G.C.s that are invited to bid, those that bid, and the G.C. that is handling the project.

Object Name	Description	Knows About
Project – G. C.	This project type will be created automatically for all projects when the initiating company is a General Contractor.	Its list of S.C.s that are invited to bid, those that bid, and those that are handling the project.

Object Name	Description	Knows About
Project – S. C.	This project type will be created automatically for all projects when the initiating company is a Subcontractor.	Its list of S.C.s that are invited to bid, those that bid, and those that are handling the project.

Object Name	Description	Knows About
RFI	This document represents a request for information that is passed from an S.C. to a G.C. or from a G.C to an Architect or Engineer.	No other objects

Object Name	Description	Knows About
Scope Memo	This document represents an unofficial change, or a suggested approach to a project.	No other objects

Object Name	Description	Knows About
Specification	This unstructured document represents the detailed specifications of a project.	No other objects

Object Name	Description	Knows About
Structured Document	This is an abstract class that represents a document that has known internal fields. This is based on one of the basic templates of the system.	No other objects

Object Name	Description	Knows About
Subcontractor	This primary actor has information and functionality specific to a Subcontractor company.	Its private list of S.C.s Its list of projects. Its list of CSI / geographical codes indicating work that will be accepted.

Object Name	Description	Knows About
Supplier / BPM / Blue Printer	This represents a registered company that doesn't need to store special information.	No other objects

Object Name	Description	Knows About
Trade	This refers to a particular building trade, such as a CSI code.	No other objects

Object Name	Description	Knows About
Unstructured Document	This is an abstract class that represents a document that has no known internal structure, such as a steam of characters or a binary file.	No other objects

Object Name	Description	Knows About
User	This represents a user of the system. A user will always belong to a company. He or she may also belong to one or more groups.	No other objects. Thus, this can't have sub-entities.

3.2.3 Web Server Considerations

At a high level the system has the following requirements and characteristics:

- The ability of the system to provide web pages quickly in response to user requests is critical.
- Availability of the system to users all day every day is critical.
- The web site will eventually have large numbers of users.
- The web pages are not overly complex or technically challenging.
- There are no legacy systems involved.
- There is only one backend database.
- One of the major responsibilities of the system is to send messages – emails and faxes.

This indicates the need for a Web Application Server coupled with a message oriented middleware such as MQSeries. The sections that follow elaborate on the choices in this arena.

3.2.4 Defining a Web Application Server

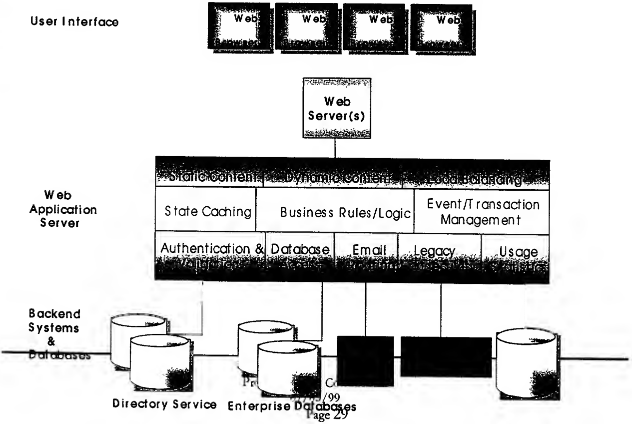
At a basic level, a Web application server is a strategic platform used to rapidly develop, deploy, and manage Web-based application logic that integrates existing legacy and client/server systems. What differentiates these products most notably from other traditional application servers is that the clients connecting to these new mid-tier servers are typically Web browsers or "thin" versus "fat" clients that store application code and data locally. Most Web application servers today support development and deployment of both C++ and Java, as well as some other proprietary tools and scripting languages. More importantly, these servers support Web technologies and standards such as Java, ActiveX, HTTP, IIOP,

CORBA, COM/DCOM, EJB, ODBC, JDBC, SSL, digital certificates, and LDAP to enhance distributed server-to-client and server-to-server sessions.

There are five characteristics of Web Application servers:

1. **Performance:** Load balancing and server fail-over route Web users to the best available server. Thread pooling and object caching optimize server resources. A scalable transaction service ensures reliable database updates.
2. **Connectivity:** App servers provide and object request broker and connection services to packaged apps, middleware services and databases. Database connections get pooled and cached for speed.
3. **Application:** App management includes standard features like software upgrading and exception notification. But it also covers on-line performance tuning of individual code components in a complex, mutli-server configuration.
4. **Ease of development:** App servers must support best of breed tools to address team development, distribution debugging and an array of in-house technical skills. The goal is to blend hard core coding with drag and drop simplicity.
5. **Transactive Content Support:** App Server vendors must provide a clear path to integration with the content catalogs, personalization and collaboration services that engender a self-service experience.

The diagram below illustrates the various components that are required for robust web architecture.



The most scalable and flexible application servers for the Web are those that support multiple platforms, are compatible with many different development tools, and provide robust high volume transactional and object model support. Other distinguishing features may include persistent memory caching, transactional isolation and recovery, database connection pooling, transaction multi-threading, event handling, state management, the ability to roll back and isolate transactions, middleware support, ERP integration, security and directory support, and object model support. High-end Web application servers are used for business-critical systems that require 24 x 7 up-time and high-grade performance.

3.2.5 Application Server Market Leaders

The following vendors currently play in this market. The grid illustrates the features and capabilities of each. During the design phase of the project the decision to move forward with a particular application server will be verified based on the characteristics of the application. However, based on our current understanding of the business requirements, we feel that the recommended technical components described later in this section will be validated as the most appropriate technical choices.

Application Server Backgrounds

Vendor	Mutli-Platform	Performance	Connectivity	Management Tools	Development Tools
IBM: WebSphere	√	√	√		
Netscape Application Server	√	√	√	√	
Microsoft MTS			√	√	√
BEA WebLogic					
Oracle Application Server	√			√	
Sun NetDynamics	√		√		√

1. **IBM WebSphere:** A well-engineered engine with good scaling potential. But IBM must offer simpler tools and clarify the landscape of WebSphere, Domino and Component Broker.

2. **Microsoft MTS:** Microsoft's platform scalability hampers for large corporate sites. Although there are a few notable companies such as DELL and 1-800-Flowers have successfully deployed large-scale sites. Its well-integrated HTML and COM strategy boosts the platform's ability to deliver self-service applications.

3. **Netscape Application Server:** Netscape's Kiva acquisition locked in it lead in Web based transaction performance.

4. **Oracle Application Server:** Tight integration with Oracle 8 makes existing customers happy but limits options for portability and connectivity.

5. **Sun's NetDynamics:** Offers good connectivity but runs out of gas in large deployments. The products integrated tool is productive but too proprietary.

   *Note: NetScape and Sun have publicly announced an aggressive plan to integrate the "best" features of their respective application servers within one year. It is highly likely that the resulting server will be backward compatible to both NAS and NetDynamics. By selecting either of these servers, one is likely to have a straightforward migration path to their next-generation application server and gain the best features of each. Furthermore, the server will likely be "tuned" for highest performance on Sun Servers.

3.2.6 Technical Components

Navigating the many vendors, product offerings, and technical acronyms in this market is challenging. Solutions vary considerably by vendor and each excels in a specific area, whether it is manageability, integrated development and deployment, object support, platform support, or advanced transactional support. Few vendors today offer a comprehensive solution.

Specifically, for this application vendor products were evaluated with the following criteria in mind:

- Scalability,
- Transaction-handling and connection/pooling services,
- Manageability and load balancing,
- Security features and access control,
- Integrated development environment,
- Object model support,

Netscape Application Server (NAS) began as an exercise in load balancing, fault tolerance, and scalability. It is generally recognized as being the best in these areas. Netscape has ignored development tools in shaping its offering, but the quality of its tools has improved. It is also possible to use third party tools, although this is complicated by the fact that Netscape uses custom HTML tags to link web pages to business logic.

Based upon this, NAS currently looks like the best choice for a Web Application Server.

Web Application Servers frequently use middleware to pass data in a guaranteed way to and from their backend systems, such as databases. There are two main choices here. One is a transaction monitor, also referred to these days as object monitors. The other is messaging middleware. It is also possible to use a combination of the two

Transaction monitors guarantee the delivery of data, and orchestrate groups of data messages (called a transaction), guaranteeing that the entire group will be passed or if there is an error, that all systems will be informed and that no data will be passed. Thus there can't be partially completed transactions. If the intent is to transfer money from one account to another, it's not possible to remove money from one account unless it also is added to the other. Transaction monitors tend to be synchronous – all the involved systems must be online at the same time, and resources wait until the transaction is finished.

Messaging middleware guarantees the delivery of data by using a feature called "store and forward". Data is placed in a queue and then an attempt is made to deliver the data to its destination. If it can't be delivered at the present time, it tries again later. It is an asynchronous arrangement. All systems are not required to be online at the same time. If a system is down, delivery is still guaranteed, because the message will be delivered when the system comes back online later. This feature is also good for performance because resources don't have to wait for the delivery of the data. A system puts data into a message queue and then immediately continues, knowing that the data will be delivered eventually.

We feel that the system will benefit more from using messaging middleware, such as IBM's MQSeries.

Thus for Phase One, we recommend Netscape Application Server coupled with MQSeries to create the foundation upon which the infrastructure would be built. This recommendation will be validated during Bid Manager's design phase.

3.3 Back-end Systems

Database

We are proposing Oracle 8I as the database for Bid Manager. Recognized throughout the industry as the database of choice for large-scale web systems, Oracle provides the both the functionality and scalability required for Convex. Additionally, we are proposing Sun servers for the application layers. During the Requirements Week, some discussion regarding the possible use of Dell servers in some capacity was discussed. This possibility needs to be further explored during the Design phase.

Fax Technology

Preliminary analysis has led us to three possible technology solutions for the fax requirements associated with Phase 1. These 3 possible solutions are as follows:

1. 3 Com IP Fax Service
2. UUfax
3. Jfax

All three of these products seem to offer the bandwidth required for the anticipated Bid Manager volumes. Additional research into these three products is ongoing and a recommendation will be made early on during the Design phase.

E-Mail

We are not comfortable proposing an e-mail solution at this time. Additional research is on-going.

The total hardware costs associated with Bid Manager Phase 1 will be finalized during the Design phase.

Entity Relationship Diagram

The initial entity relationship diagram required for Bid Manager Phase 1 is included at the end of this proposal as Attachment 1.

4.0 Approach and Methodology

We propose that the project to develop the Bid Manager (Phase I) aspect of on-line construction portal for CONVEX Technologies, Inc., be undertaken in three phases. The first phase will be a Scope Phase, followed by a detailed Design Phase, followed by the Development Phase.

The Scope phase will finalize the functionality that can be delivered by the October timeframe in addition to identifying high level functional features of Phase Two and Three. While focusing on Phase One, the Design Phase will finalize the detail of the required screen layout and supporting functionality, creating a detailed Business Design. In addition, the high-level technical design will be prepared, reviewed and approved with CONVEX Technologies.

The Design Phase will also provide a revised estimate on the effort required to complete the Development Phase. The goal will be to deliver the revised estimate before the completion of the design, leaving enough time for the estimate to be approved by the design end date. This will allow the Development Phase to begin immediately after the Design Phase. This will be required to meet the target dates.

The Development Phase will consist of two major types of activities, implementation and Testing. Implementation consists of coding and unit testing. Testing is broken out into Integration testing and System testing. Integration Testing is the process of integrating the separately developed modules, scripting the testing, executing the tests and fixing defects that are discovered. System Testing ensures the integrity of the overall system through a series of rigorous stress and performance testing. Once these activities are completed the system is ready to be rolled out.

4.1 Scope Process

4.1.1 Scope Process Overview

"Scoping" is the method by which specific functional and technical aspects of an application are explored, defined and committed to by a cross-functional project team. It sets the scope of the application to be developed in specific and actionable terms. The goal of this effort is ensure that the scope of work for the Bid Manager is thoroughly understood.

The *Scope of Work* document reflects a high-level functional and technical specification for the project in the context of your present IT architecture. It also will define the application for subsequent phases of the project.

Through an iterative process the Scope of Work comes to represent the functional, creative, and technical aspects of the application.

Development of the Scope of Work often begins with a *Functionality Matrix Workshop*, which forces the team to evaluate and prioritize specific functional requirements of the application with an eye toward the costs, tangible and intangible benefits of each.

The *Functionality Matrix* is used, as a tool to define what functionality is needed for a given application. It is a grid of cells collected into rows, each of which contains a grouping of closely related tasks, which need to be developed together. Its purpose is to succinctly display the grouping and prioritization of functionality discussed during the project.

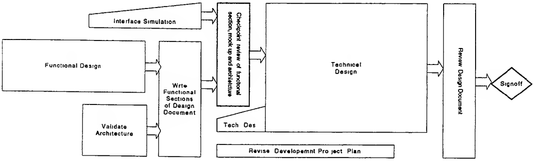
The matrix has both row and column headings (alpha and numeric, respectively). From left to right are the most important to least important functions. A solid line indicates which functionality will be included in this project phase – that is, cells to the left of the solid line are within scope. The cells appearing to the right of the solid line indicate functionality that would be implemented in a future phase. Additionally, light shading has been used to identify functionality that is not currently in scope but would be nice to have.

A cell is a set of functionality that must be developed in its entirety to have an important impact on your business. *This doesn't necessarily mean that a cell cannot be broken down further into smaller pieces.* Each cell represents a distinct, implementable group of actions, often determined partially by a business process flow. The functionality matrix shown below was developed for one of our previous clients, however indicates the depth of this exercise.

The importance of this exercise cannot be overemphasized. It ensures that all the participants share a common vision of not only *what* the team is doing, but also *why* they are doing it. Failure to achieve this consensus before work begins is a primary cause of failure among e-Business development efforts. An example of a Functionality Matrix is included at the end of this proposal as Attachment B.

4.2 Design Phase

4.2.1 Design Process Overview



Overview of Design Process

The figure above identifies the activities proposed for the Design Phase. The detailed functionality will be clarified through a short series of user meetings. In parallel with these meetings a mock up of the user interface will be provided to aid in the evaluation of the detailed functionality. CONVEX Technologies will then verify the functionality at the checkpoint. Technical design and revision of the development plan will continue in parallel. The technical design sections will describe the architecture for Phase One, identify the required software modules, each module's function, and the interfaces between modules. The architecture will be designed taking into consideration the high level requirements for the follow-on phases.

4.2.2 Functional Design

Functional Design refines the functionality into a viable user interface, and defines the relationship between the user interface and the backend systems. Functional and User Interface Design is iterative in nature. We suggest a total of seven working days duration for this activity. In Functional and User Interface Design the following will be refined with CONVEX Technologies:

- The process flow,
- The screen flow,
- The functionality and layout of the screens, and
- The data required from the backend systems

To allow the design to proceed effectively individuals to fill the following part time roles need to be provided by CONVEX Technologies, Inc.:

- User expert (to provide input on the content, flow and acceptability of the proposed user interface)
- Business Process Expert (to provide data on the required business flow for Phase One)

The maximum time spent on user meetings will be five hours per day. Not all the roles will be required for all the meetings. A detailed meeting schedule will be agreed between CONVEX Technologies and Primix/E-Logical prior to the start of the Design Phase.

4.2.3 Interface Simulation

An HTML-based *Interface Simulation* is developed to represent the interface of the finished application, as it will appear to one or more targeted end users.

Primix has learned that the use of these simulations early in the development process serves two ends. First, it makes the application "real" to executive management inside the client organization, which aligns expectation of the project's end product and solidifies support for the project itself. Second, it allows the Project Team to solicit feedback from targeted end-users in a very natural way, and to incorporate that feedback into the design of the application. This simple but often overlooked technique improves adoption of the finished application, increasingly the likelihood of delivering business results.

4.2.4 Validate Overall Architecture

After the functional requirements are detailed, the proposed architecture will be reviewed to ensure that the architecture still meets the revised requirements. Given that the functionality is already well defined in most areas Primix believes that this will be a short task, but necessary to mitigate the risk of a costly mistake in the architecture definition.

4.2.5 Checkpoint

The detailed functionality will be documented in the relevant sections of the design document. These sections, as well as the section documenting the architecture, and the mock up will be given to CONVEX for review. It is our preference that a review meeting should be held within three business days of the draft being provided. We will then address any comments that arise from the review process, and will incorporate any changes into the final complete document, which will be produced at the end of the technical design activity.

4.2.6 Technical Design

The Technical Design Phase moves from the architecture validated during the functional design activity to a module level breakdown of the proposed components:

- Customization of dynamic HTML templates,
- Static HTML for the Web server.

For each module identified the following information will be provided in the completed design document:

- Module name and description,
- Required behavior for the module,
- Module interface to the rest of the Bid Manager application.

During the Technical Design Phase interaction with the user community is normally carried out on an as required basis to resolve issues and questions that arise during the design process. The time required from users to deal with the issues that arise is typically insignificant.

We would like to provide an informal technical meeting on a weekly basis. The purpose of the meeting would be for the Design team to discuss the progress of the design activity, and to outline any major design decisions made. In our experience this is an efficient way to broaden understanding of the project within a client organization.

4.2.7 Revise Development Project Plan

A step-by-step Project Plan is also produced during Design. The plan defines key milestones for the project, identifies the critical path of development, and states the level and depth of resources required during each week of the project.

There is no more powerful evidence of our belief in the power of strategic preparation and detailed planning to manage the development risks of a project than our willingness to commit to a fixed-price/fixed-time bid for Development at this point in the process.

From this point, the launch date and budget for the project are locked. Barring changes in scope you believe are necessary during implementation, we guarantee the timing and expense of the project from this point, with our fixed development bid.

4.2.8 Review Design Document

After the technical design activity has been completed there will be a short time to complete the design document. The design document will be provided to CONVEX for review. It is our preference that a review meeting should be held within three business days of the draft being provided. The review process will only address the sections that have been added since the checkpoint reviewed the required functionality. We will incorporate any changes into a revised version of the Design Document which will be provided for CONVEX approval as soon as possible after the review process has been completed.

4.3 Development Phase

4.3.1 Development Process Overview

The goal of the Development is to build and test the solution specified in the Design STEP.

The primary Development deliverable is, of course, the application itself. Additional deliverables are tailored to individual customer requirements. These may include solution code, an updated Design document, an installation guide, a user guide, and a system administration guide.

Tasks within the Development include:

- Building all user interfaces, functionality, data schema, integration and connectivity required for the solution
- Connecting user interfaces to functional layers and test data
- Configuring and testing hardware and networking infrastructures
- Performing integration testing of the solution components
- Performing system testing of the completed solution
- Conducting end-user acceptance testing to reaffirm that the solution meets the specified requirements

Primix has a unit testing methodology that requires the implementer to identify the types of unit testing that they propose for a given module. The senior technical member of the functional team reviews the proposed tests. This ensures comprehensive unit testing.

Samples of the code are also reviewed by peers and by senior technical members of the team. These code reviews are used especially at the start of the implementation process to ensure that standards are being followed, and good coding practices are being used.

4.3.2 Integration Testing

Integration testing of the Bid Manager will concentrate on verifying the integrity of the design and internal interfaces, and a significant portion will be carried out in parallel with the implementation activity.

An integration test plan will be produced before integration testing begins. This will outline the testing to be carried out and any data needs. It is proposed that integration be performed incrementally. This means that the production of modules from the different functional areas will be coordinated so that they can be integrated and tested as a stand-alone function. There is not currently enough information available to provide a detailed plan for integration at this stage. The detailed plan will be provided during the Design Phase.

As defects are discovered during testing, they will be prioritized and passed to the development team to fix.

It has not been verified with CONVEX what criteria are typically applied to validate that an application has successfully completed integration testing. For estimation purposes Primix have applied our standard criteria that 95% of tests are executed and no critical level defects are open.

4.3.3 System Testing

The activities that Primix considers part of System Testing:

- Execution of test scripts in a formal system test environment
- Performance testing
- Volume Testing

4.3.4 Deployment

In the **Deployment STEP,** we deploy the fully developed and tested solution into your production environment. We have found that each client has special requirements for solution deployment and therefore we are very flexible in defining Deployment STEP deliverables. During this step, Primix ensures that the solution is stable and providing business value to your company, customers or business partners. Because of the need to provide reliable service we may need to investigate the possibilities of hosting this application with an application hosting party such as Exodus, Digex etc.

5.0 Project Plan

5.1.1 Schedule

The Scope runs from a proposed start date of 7/19/99 to 7/23/99. The outcome of this week would be the functionality matrix and consensus regarding the features and functionality if Phase One that we can deliver by the desired date. The design phase will begin on 7/26/99 immediately following the scoping session. We are allocating 5 weeks for design however will attempt to complete this in 4 weeks. In order to meet the aggressive overall timeframe it is suggested that the revised development plan be delivered by 8/20/99.

The Project design team will work at the CONVEX Technologies site for the UI Design Phase. We anticipate that the entire design team will require six (6) consultants.

5.1.2 Milestones

Milestones are key points in a project where demonstrable progress can be seen. The suggested milestones for the Scope & Design Phase are given in the following table.

Milestone	Date Due
Scope Start	7/19/99
Scope Completion with Functionality Matrix	7/23/99
Design Start	7/26/99
Delivery of functional sections for review	7/13/99
Delivery of Interface Simulation	7/13/99
Delivery of revised development plan	8/20/99
Delivery completed design for review	8/27/99

5.1.3 Deliverables

There are three deliverables to CONVEX Technologies at the end of the Design Phase. These are the Design Document, the mock up (Interface Simulation), and a revised development plan.

The Design Document will be delivered in two installments. The first installment will consist of the functional sections. A mock up of the screens will also be delivered. Together the first sections and the mock up comprise the functional baseline for the Phase One system. A complete Design Document will be delivered after the technical design.

In addition a revised development plan will be provided to CONVEX. This will be a much more detailed version of section 5.2.2 Milestones for Development.

5.2 Development Phase Project Plan

5.2.1 Schedule

In essence, the development runs from a proposed start date of 9/6/99 to delivery of the system-tested application on 11/26/99.

5.2.2 Milestones

The suggested milestones for the Development Phase are:

Milestone	Date Due
Development Start	9/7/99
Software and Hardware Setup	9/13/99
Completion of Implementation	11/5/99
Completion of Integration testing	11/12/98
Completion of System Testing	11/26/99

The hardware requirements will be finalize two weeks from the official start date. It is expected that the hardware be available for the start of development.

6.0 Primix Solutions

Primix Solutions brings strategic insight, creative talent and technical depth together to help clients solve problems, capitalize on new opportunities, and achieve business results online.

Since 1994, we have delivered innovative e-Business solutions to our customers using best of breed technologies on a fixed-price/fixed-time basis. We specialize in "through the enterprise" solutions that tie Internet-based applications – serving customers, staff, suppliers, business partner and distributors – to existing ERP and legacy systems.

Primix has a track record of successful engagements in which we have helped our customers take advantage of information technology to establish closer relationships with their customers, suppliers, distributors, and employees. We have developed solutions for clients across many industries – Oil and Gas, Consumer Packaged Goods, Manufacturing, Financial Services and High Technology.

What Makes Primix Different?

- **Industrial strength systems integration skills**
  - Power to execute, meet challenges, manage risk
- **Big Ideas**
  - Strategic insight and creative talent
- **Passion for business results**
  - Track record of client satisfaction

In December 1998, Primix acquired Advis, a privately held Boston-based e-Business software consulting company, adding to its depth of capability in highly advanced Internet and object-oriented technologies.

Our Vision

Passion to Deliver Business Results.

We know getting business results online is hard work. It takes strategic insight, creative talent, and technical depth. It takes experience. It takes discipline. It takes good people.

Primix Solutions (Nasdaq: PMIX) brings all these together to deliver e-Business solutions that exceed customers' expectations. Our more than 100 professionals – with backgrounds in systems integration, management consulting, software development, advertising, and design – have done
exactly that for clients including AT&T, Apple, Gillette, Rockwell, Data General, ConAgra, Fannie Mae, Lucent and Standard & Poors.

Our business is IT solutions. But our passion is business results.

7.0 Primix Solutions and logical-E Qualifications

CONVEX's Bid Manager is the initial phase of a three-phase project that will ultimately link the entire value-chain of the commercial construction market from project conceptualization through supply chain purchasing. Bid Manager functionality will provide a Pre-Construction Service Portal that will enable commercial construction communities to participate in more efficient and cost effective bidding practices. Delivery of a successful solution for Phase I will require expertise in a number of areas:

- ***Complex Project Management Methodology to Support Technical Complexity and Time-to-Market Urgency*** – CONVEX is entering a highly competitive marketplace. Rapid time to market is essential. Each phase of this project presents its own unique technical challenge and each subsequent phase will build upon its predessors.
- ***Intuitive Graphical User Interface Design*** – CONVEX's target users are, on average, non-technical users with little or no PC experience. Bid Manager's GUI design must be completely intuitive to this target audience yet sufficiently powerful to provide full-featured functionality throughout the complex bid process. The page flow must also be designed to incorporate future functionality to be added during subsequent phases.
- ***Web Architecture*** – The primary technical requirements for Bid Manager will be heavy messaging infrastructure, high-performance response times and extensible design. Phases II and III will require high-volume transaction capabilities and high-bandwidth. Bid Manager's architecture must be designed to support both immediate and future scalability, performance and robustness requirements.
- ***DataBase Architecture*** – A primary component of Bid Manager is the ability to store 1.5 million records. Furthermore, Phases II and III will require storage of blueprints for all of the projects as well as access to as many as one billion SKUs of Building Product Materials (BPMs). Thus, the database must be designed to handle significant extensibility

The following examples of e-Business solutions delivered by Primix Solutions and logical-E demonstrate expertise in each of these respective disciplines:.

7.1 Project Management Experience

The ability to deliver large-scale, multi-phased projects under tight time constraints requires a strong methodology that drives tight project control and frequent deliverables. It also requires experience in working closely with the client's team to ensure effective communication and build consensus. Primix demonstrates this ability in all of its engagements but the following examples illustrate projects that were large in scale, multi-phased and required rapid delivery:

Rockwell Collins (Rockwell)

Workforce Information Network (WIN) - Employee Self Service Application

Rockwell Collins is a $2.4 billion business unit of Rockwell International and a global leader in the development of integrated aviation electronics systems for military and commercial aircraft. The company employs 14,000 people in the U.S. and abroad and leads the aviation industry in the development of communication, navigation, surveillance and situational awareness technologies.

Rockwell had selected SAP R/3 to manage a wide range of strategic business processes. A Web based employee self-service (ESS) solution known as WIN was planned to leverage the standard functionality provided in SAP to enable employees to obtain and update information through the corporate Intranet. Rockwell defined the solution as "critical path" due to Government auditor's time-entry requirements so that the 18-month R/3 implementation could not go-live until WIN was completed. This fact was realized well into the SAP implementation resulting in a hard delivery requirement of just 13 weeks for Design and Development of WIN.

After a thorough evaluation of potential System Integrators, including D&T and SAP, Rockwell Collins selected Primix Solutions to deliver WIN. Primix built the solution using its fixed-price/fixed-time service methodology and completed the project within Rockwell's tight timeline.

WIN enables Rockwell Collins employees to perform the following functions through the Intranet:

- <u>Time Entry and Time Off</u> – enter time sheets for government and non-government projects; register and track vacations, sick and personal days and leaves of absence.
- <u>Manage Personal Information</u> – update addresses, phone numbers, dependent information, emergency contacts.
- <u>Organizational Directory</u> – obtain organization structure and employee contact information, including employee photographs, through a searchable personnel directory.
- <u>Training and Events</u> – search for and enroll in training courses, and track training history.

Primix was responsible for coordinating design and development between its twelve consultants delivering WIN, Rockwell's business managers, IT staff, D&T consultants implementing R/3 and SAP's core consultants. Primix developed an innovative architecture to meet Rockwell's flexible interface functionality and system performance requirements. The R/3 implementation process was highly iterative, involving a phased rollout approach and required tremendous project coordination skills to react to regression modifications in SAP. Primix was commended repeatedly for not only delivering WIN on time, but also for adding value to other project teams in their tasks to bring R/3 on-line.

Hughes Christiansen Corporation (HCC)
MAPIT – Configuration and Quote Application

HCC is a division of The Baker Hughes Corporation and is a worldwide leader in the design, manufacture, and application of Tricone® and diamond drill bits used in oil and gas drilling operations. To build a proposal, the company's worldwide field salespeople must often compare extensive performance information from wells drilled in similar geological formations across the world. This analysis is used to develop recommendations for the best drill bits and operating parameters to drill a customer's new well. The complex analysis process traditionally took sales and engineering two to three days to prepare. HCC realized that it could gain a strong competitive advantage by giving its world-wide sales force the ability to easily access pertinent information buried in the complex layers of technical specifications and drill bit performance histories across the corporation to prepare quotes in a matter of minutes - rather than days. Because the sales force operated in many of the most remote regions of the world, the Internet coupled with HCC's WAN was selected to deliver the automated analysis and bidtool – *MAPIT.*

HCC selected Primix to deliver the solution based on our proven STEP™ consulting methodology, expertise in complex systems integration, and ability to transfer knowledge to HCC's IT staff.. Primix delivered MAPIT in several phases over a seven-month period at a price of $1.8 million with a team of 16 consultants. As initially anticipated, *MAPIT* now enables salespeople to draw on centralized product specifications and performance data collected from the company's worldwide drilling operations when recommending drilling technologies to customers. Additional features created during the Scope and Design processes include competitive performance data collected worldwide. This allows HCC salespeople to show customers comparative product performance data during the sales presentation.

The "Empowerment" aspect of STEP™ was utilized to train HCC personnel so that they were able to provide most of the second phase of this evolving system. Phase II is currently in worldwide rollout. The new functionality built delivered in Phase II collects drill bit failure analysis from HCC's customer's so that the information can be utilized to improve product design and provide valuable feedback to their worldwide customer base.

HCC was very pleased with *MAPIT* and Primix will continue to work closely with the client's internal team to deliver upcoming functionality improvements.

7.2 Graphical User Interface Design Expertise

Functionality, robustness and performance offered via an Internet site are only a small part of the overall design requirements to deliver a truly successful solution. That is, an experience designed to meet both the technical *AND* emotional needs of the target end-user. Primix approaches every engagement with the objective of building a "persuasive IT solution". To achieve this goal, our sites must provide an intuitive and comfortable feel tailored to the specific characteristics of the targeted external and/or internal constituencies. Our creative design process is integrated tightly with our STEP™ methodology to ensure that end-users receive the functionality they need at the performance levels they require - in an intuitve, user-friendly environment tailored to their unique perspectives. The two case studies below describe very different target audiences that were effectively won over by Primix's ability to design a persuasive solution tailored to their unique needs.

Data General (DG)
DG Now – On-line Sales and Order Management Application

Data General, based in Westboro, Massachusetts, is a $1.5 billion supplier of storage and enterprise computing solutions for customers worldwide. The company's products include CLARiiON Fibre Channel storage systems, high-end NT and UNIX AViiON servers, and related software and services. DG realized that it could improve customer service, gain new customers and increase the efficiency of its sales force by creating a full-featured, highly personalized, on-line sales channel.

Data General selected Primix over a wide array of competitors to deliver a highly customized solution which would complement the company's direct sales force by tightly integrating past puchasing trends with an on-line channel. Primix's creative process delivered a series of "Big Ideas" which have truly differentiated *DGNow* from other on-line sites. One feature, the *Now*List, allows a customer to bookmark frequently bought items. Another feature, *Now*Orders lets the buyer save his or her favorite shopping list of products for quick reordering. The site provides users with a uniquely customized experience based on each registered user's feedback, historical purchases, current purchase orders and contract pricing, where applicable. The site features simplified product configuration, purchase tracking, cross-selling, context-driven menus, and real-time intelligence to maximize revenue by ensuring that customers can easily find and order the products they needs.

IDC market analyst Janet Waxman reviewed the Data General *Now* site and proclaimed it to be one of the most integrated e-commerce implementations. "This site is well thought out and not only brings user friendliness features, but is supported with a comprehensive, integrated back-end to the company's existing systems," said Waxman. A summary story featuring *DGNow* was recently included as the cover story of PC Week magazine.

Primix delivered this solution in a series of phases - on-time and on-budget - and continues to work closely with DG to contiuously enhance user functionality and data collection for DG's sales and marketing teams. Primix is also working closely with Data General – Europe to leverage *DGNow* by designing new features tailored to European customer's needs and providing multi-language functionality required to make users feel comfortable interacting with the site.

Con Agra Refrigerated Foods (CRFC)
Carrier Internet Response Update System (CIRUS) - Carrier Qualification & RFP Application

CRFC, with $13 Billion in annual sales, is one the largest food products company in the world. CRFC ships these products using a large network of independent carriers. For 15 years the company had managed the process of examining carrier qualifications and creating proposals for service through a mainframe-based shipping management application known as SureShipping. The limitation of this system was that transactions surrounding the process had to be sent via EDI or FAX to carriers and all responses were manually entered into the mainframe. Essentially, every contact between producer and shipper required the intervention of a CRFC operator. CRFC chose to solve this limitation by implementing an extranet application. Primix was chosen to partner on the project with CRFC and Innovative Computing.

Primix designed a user-friendly interface that simplified available transactions since many of the end-users were independent truck drivers with no PC experience. Specifically, Primix designed the interface to reduce the overall cost of the system compared to other approaches which CRFC had considered. The design hid the complexities of the back-end shipping application by tailoring the flow solely to information required by the user. At the same time Primix was able to add new functionality that was not available in the SureShipping application, such as data verification. The screen flow subtely educated the end-user making it easy for them to learn and interact with the system. Finally, CIRUS improved the performance of the SureShipping application by validating data at the front end, eliminating the need to correct errors later. CRFC was extremely satisfied with Primix Solution's performance as their communication problems were eliminated, operations cost savings were realized and the project was delivered on-time and on-budget.

7.3 Architecture and Integration Expertise

While many solutions delivered by Primix require high-performance and scalable application architectures, the two enterprise architectural case histories below illustrate engagements where Primix was selected to re-architect complex information system technologies that evolved haphazardly through corporate acquisitions over many years. Redesigning existing architectures to overcome infrastructural limitations developed over the life of an enterprise application is recognized as the most complex form of architectural design and development.

Lucent Technologies, Inc. (Lucent)
ConfigPro - Distributed Product Configuration, Pricing, and Ordering Application

Lucent maintains literally hundreds of distinct business critical applications that must exchange data in order to support current and future business processes. Historically, these systems were integrated via system-specific, custom-built application bridges. These proprietary bridges were expensive to build and maintain. Furthermore, when either end of a bridge changed, it was typically discarded, thereby wasting the potential benefits of reuse.

Recognizing that new systems are routinely brought on-line while older systems are decommissioned, Lucent was looking for a robust architecture to support high-bandwidth data flows, enable significant reuse, and scale to meet the significant size of the company.

In one particular application area, a critical product configuration system was having severe performance, stability, and scalability issues. Based on the Trilogy platform, this distributed product configuration application required connectivity to multiple backend systems in order to function effectively. These downstream systems included standard and custom, ERPs and databases.

Primix Solutions was contracted to design and develop, a plug-and-play distributed architecture which could be used to both, immediately resolve the product configuration application issues, and also be capable of supporting the myriad of other systems with an extensible infrastructure.

In the design phase of this engagement, we were able to specify a system that met all of Lucent's requirements. The solution was designed to leverage Lucent's existing investment in IBM MQSeries messaging technology and consisted of a COM-based distributed component architecture to hide the details of the underlying message system, while providing and easy-to-use framework for integrating new applications, servers, and services. Ultimately, this system utilized security, transactioning, auditing, naming, directory, and brokering services to provide the high performance, scalable and reliable plug-and-play environment that Lucent demands. The "plug-and-play" solution provided by Primix Solutions delivered performance and scalability far exceeding Lucent's expectations. Primix Solutions is currently developing the next version of the configuration application and is utilizing the same message-based distributed component architecture. A series of five additional re-architected solutions will be delivered over the next 15 months at Lucent.

"Working with Primix, we developed a new strategy for our systems architecture that will increase our agility in developing business solutions while reducing the cost of development efforts. The Primix team did a phenomenal job designing this architectural strategy and delivering the solution on budget in only 90 days."

Stacy Gelman
Chief Information Officer
Lucent Global Service Provider

Level 3
Real Time Billing and Order Management Solutions

This Denver based Telecommunications Company has helped to redefine the industry with its innovative ideas and unique approach to bringing new services to its subscribers. These innovative approaches eventually forced the company to investigate a more robust and scalable architecture in-house for delivering timely information to its customers.

Primix Solutions helped architect and implement a series of enterprise architecture solutions for this client using the tool set provided by Active Software. The core of the applications are being built and deployed around customer service. The first application was bill presentment and integrated the company's billing module with their own internal customer database. Presentation of the integrated solution is handled through a browser interface. Our responsibilities included designing and building the connectivity solution and designing the interface that presented this information to the customer. System highlights include real-time connectivity to the billing system and interactive queries defined by the customer. The connectivity solution supplied by Primix has been incorporated into Active's suite of adaptors.

The second application focused on integrating the company's Order Management system into the lifecycle of an order at Level 3. The integration work consisted of four additional internal systems beyond Order Management. This integration automated the process of taking an order and decreased service time by over three weeks.

7.4 DataBase Design Expertise

AIRTOUCH CELLULAR

Designed, developed, and built ORACLE and INFORMIX databases and applications for the new systems development team and extensively tuned existing production databases. Installed and converted version 9 Oracle Applications to version 10. Developed, installed and configured a large (40 Gigabyte) ORACLE OLAP database used for segmenting the customer base. Implemented a very large INFORMIX database environment (200+ Gigabytes) on a pair of large SUN machines. Designed and implemented an industrial strength database backup and recovery system for AirTouch Cellular Los Angeles Market (130+ UNIX machines - SUN, HP, AIX, DYNIX) utilizing Legato Networker. Installed and configured Netscape Commerce Server and ORACLE's WEB server product for a prototype intranet project. Performed database recovery of the production ORACLE Financial's database with no loss of data and minimum system downtime after database corruption. Upgraded existing ORACLE database's to the latest certified version.

ISO ALLIANCE (Limited Partnership of Perot Systems, Ernst and Young, and ABB)

Installed, configured, and supported the development, testing, and production implementation of as many as 41 (at once) Oracle databases on 12 Digital UNIX machines. The project was to create both the operational and administrative systems for the ISO (Independent System Operator). The ISO is a completely new company created to run the deregulated Electricity market in California. Installed, configured, and supported all Oracle Applications databases (using version 10.7, 10SC including General Ledger, Accounts Payable, Purchasing, Fixed Assets, Project Accounting, Electronic Data Interchange (EDI), and Accounts Receivables). Worked extensively with developers to debug and tune the applications and customizations of Oracle Financials and Oracle Applications. Implemented the super high availability operational systems using Oracle Parallel Server operating on a Digital UNIX TruCluster machine.

8.0 Business Proposal

This section describes our Fixed-Time/Fixed-Price proposal to deliver Bid Manager's Design Phase. As described in the Project Plan, Primix's traditional creative process and functional Scope STEP™ were modified to meet CONVEX's needs during the Requirements Weeks. Therefore, Bid Manager's Design phase will begin with a four-day Scope following the STEP™ methodology to formally build a detailed Functionality Matrix for Phases I, II & III – but focused especially on Phase I. From this matrix, we will jointly determine the specific functionality required to deliver maximum business value to the target end-users within the time guidelines required to deploy Bid Manager. Immediately following Scope completion, we will launch the formal Functional and Technical Design Phase targeted for completion twenty-one (21) business days later.

Normally, we would not be able to provide a Fixed-Time/Fixed Price bid for Design until the Functionality Matrix was completed. However, we believe that logical-E and Primix learned enough about the overall CONVEX solution and the business requirements for Bid Manager, that we are comfortable providing hard pricing and duration for this phase. At the completion of Bid Manager's Design Phase, we will be prepared to deliver a Fixed-Time/Fixed-Cost bid for the Development Phase.

8.1 Fixed Price and Fixed Time Design Proposal

This Phase will be comprised of the functionality matrix design/approval process and Bid Manager's functional design and the technical design. The purpose of this phase is to finalize the detail of the required screen layout and supporting functionality. Primix and logical-E determined that the effort required to complete this process will require five (5) weeks, seven (7) consulting skill-sets to cover the required range of technical disciplines, a Client Partner and additional intermittent personnel support as required to deliver specific core expertise. Deliverables provided at the end of this phase will include the Design Document, consisting of the functional and technical specifications, the screen mock-ups, and a detailed development plan. As mentioned above, a delivery from Design will be a Fixed-Time/Fixed-Cost bid for Bid Manager's Development Phases. Per CONVEX's direction, Primix and logical-E anticipate beginning the Design Phase on Monday, July 19th. Primix and logical-E will deliver the complete Design Phase for a fixed price of $291,000.

*It is assumed that CONVEX will pay reasonable travel and living expenses at cost. Travel and living expenses are not included in the Design fixed price above.

8.2 Participant Discipline Requirements for Scope/Design STEP

Primix Solutions and logical-E have determined the mix of skill categories required to deliver the Bid Manager Design. They are as follows:

- Project Manager – Manages project schedule, resource assignments, reporting, and deliverable production
- Project Client Partner – Manages inter-company relationship, contract administration and approves deliverables
- Senior System Architect – Lead application designer who provides senior project technical leadership
- Data Base Lead – Designs and develops database schema and database loading and reporting
- Creative Lead – Designs application look & feel, usability, web site templates, and brand development
- HTML Consultant – Primary developer of web applications including HTML and database access methods
- Business Analyst/Associate Consultant – Provides software development and documentation support
- Industry Analyst – Provides domain knowledge and industry best practices expertise that contributes to design. This role will be filled by Convex.

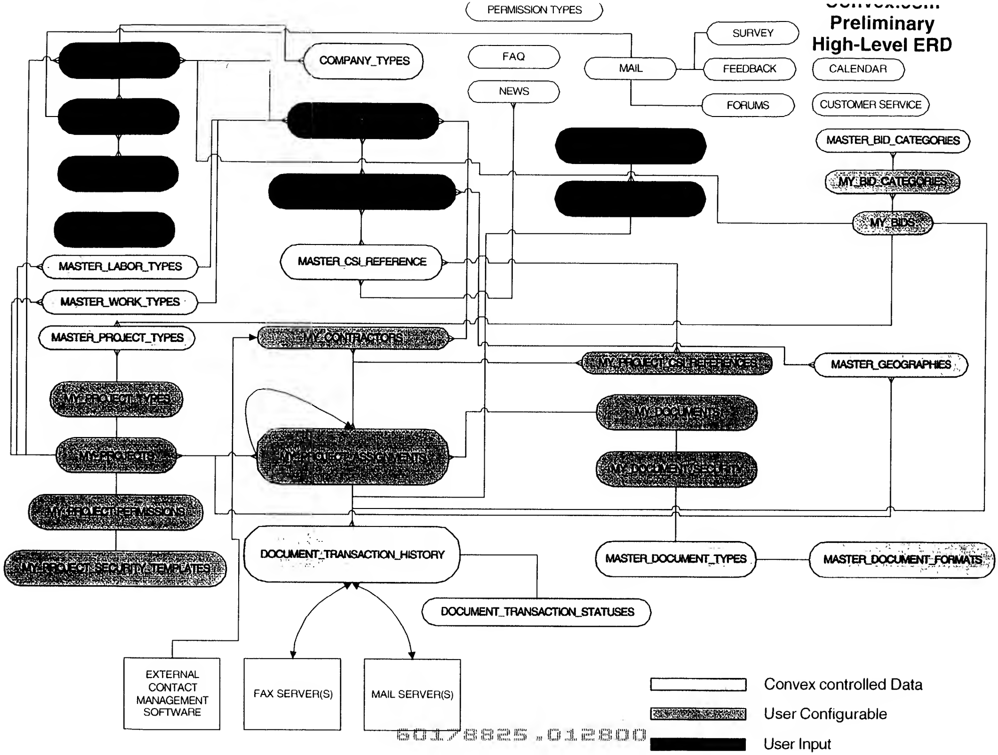
Proposed Design Team

Sr. Project Manager	$1,600/day	for 25 days	$40,000
Sr. Systems Architect	$1,600/day	for 25 days	$40,000
Data Base Lead	$1,600/day	for 25 days	$40,000
Creative Lead	$1,300/day	for 25 days	$32,500
HTML Consultant	$1,000/day	for 25 days	$25,000
Business Analyst	$1,200/day	for 25 days	$30,000
Associate Consultant	$1,100/day	for 25 days	$27,500
Client Partner	$2,000/day	for 12.5 days	$25,000
		TOTAL	$260,000
	Plus 12% contingency fee for Fixing cost		$31,200
		Fixed Bid	**$291,000**

8.3 Best-Estimate Price for Development

The Development Phase is comprised of the implementation and integration stages. The purpose of this phase is to take the detailed technical and functional designs that evolved from the Design Phase to build unit tested coded components. These units will then be integrated and tested before being deployed. Our current best-estimate range for Bid Manager's Development Phase is $800,000 to $1,200,000. Once again, a Fixed-Time/Fixed-Cost proposal for the Development Phase will be delivered upon completion of the Design Phase.

Preliminary High-Level ERD



Employee Self Service Functionality Matrix Example

	1	2	3	4	5	6
Managing Personal Information	View and modify home, business, and school address	View and modify phone numbers (Business, home, fax 1, fax 2, VPN)	View and modify personal information including name and marital status	Create and modify education information (institution, degrees, etc.)	View and modify name, address, and phone for emergency contact	Create, and modify prior employer information
Time Entry and Time Off Interface to CATS	View, enter, and correct absences & attendance (personal leave vacation, etc)	View, enter & modify time recorded for Network Activities	Restrict Network Activities to be selected from a Work List based on profile	View, enter, and correct time recorded against Cost Centers and Orders	View, enter, and correct time to overtime categories	Allow entry of time in start to start format
Organization Directory	Look up employees by Name from Corporate or Collins	View key information for a selected employee	View reporting structure for an employee (who he reports to, who reports to him)	Advanced Search Capability to Search by Multiple Fields	View a photo of the selected employee	
Training and Events	Search for training courses and view curriculum	View session schedule and availability	Enroll/pre-book in a selected session, add to wait list for full classes	Withdraw from a session	View personal training history	Allow manager to enroll his resources in training sessions
User Login and Authentication	Authenticate users using unique id and password combinations	Allow ITS to access SAP with a generic user id	Allow users to self-register for system access	Allow automatic password resetting	Send passwords via encrypted communication and store encrypted in SAP	Log all WIN access attempts.
Corporate WIN Integration	Provide URL link to Corporate WIN system					
Employment and Salary Verification	Display online instructions for Employment and Salary Verification	Request for employment verification to send specified 3rd party	Optionally include salary information	Specify delivery via fax or postal mail		

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ATTACHMENT G

BUZZSAW

BID SYSTEM

eBuilt

Buzzsaw Bid System

Functional Specification and System Design

Fifth Draft

Prepared by:

eBuilt, Inc.

Distribution list:	**Changes:**
CONVEX	Creation: 08/01/99
Joe Lindsay	Updated: 08/31/99
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Joe Manna	Updated: 09/15/99
Jim Hayes	Updated: 09/24/99
Tony Magill	Updated: 10/28/99 Clarified bid system deliverables from portal

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Section Contents

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1 Purpose of this Document

This document describes system functionality and design of the Buzzsaw Bid Management System, formerly known and referred to herein as CONVEX. The document is written from a business process perspective. The requirements described in this document have been deduced from numerous meetings and documents, and represent Phase One system design.

2 Introduction and Overview

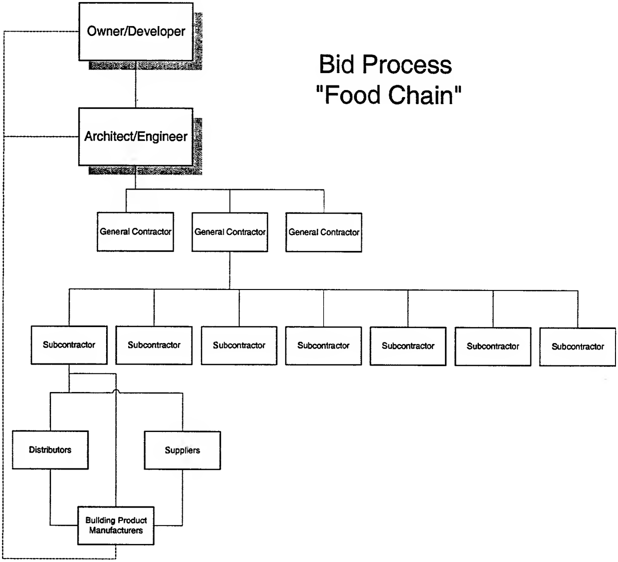

Figure 1: Construction Business Organizational Overview

The CONVEX system will bring the construction business into a complete, automated online system that integrates project management, bid management, and supply chain functions in a

centralized Internet system. Ultimately, the CONVEX system will be the catalyst for a new business model that changes or eliminates common roles in existing business models (paradigm shift), saving the industry billions in overhead by facilitating resource reduction, time, and efficient resource management. The CONVEX system will also leverage new business relationships made possible by uniting all the industry's business entities into a single system. The CONVEX system will become an ideal portal site by combining construction business relationships, captured business data, industry data, and news.

The CONVEX system will be designed to permit valuable and simple access to project authoring (invitation to bid) and bid submission processes. The system will also provide significant value in the form of services and information retrieval for portal users. A key element will be the application of real world business knowledge in the processes. Therefore, the CONVEX system will not:

- Make assumptions about which user can author projects or become a bid recipient.
- Attempt to enforce a specific workflow or make assumptions about what actors participate in a particular workflow, which is particularly important in managing subcontractors or other contractors.

> **Example:** General contractors (GC) need flexibility when selecting recipients of certain documents since contractors are in competition with other contractors. GCs want their favorite subcontractors to win the bid, and will do whatever it takes to ensure that they have a fighting chance. A GC may not be helpful to a subcontractor he suspects is bidding for a competing GC.

The CONVEX system must consider the workflow participants when implementing GC and subcontractor user interfaces. The CONVEX system must give users the ability to work the way they are accustomed to working and not jeopardize their businesses' existing processes.

This document will address the first of four phases of development of the CONVEX system:

- Bid Management
- Document Distribution (Blueprints)
- Supply Chain automation
- On-Line Auction

While consideration of other phases is important in system design, the purpose of this document is to define the functionality of a Phase One deliverable with consideration of future phases. These features will run in the context of a portal website providing valuable content and services for the construction industry. Specification of the portal site is outside the scope of this deliverable as well.

2.1 System Actors

This section provides an overview of the primary actors in the CONVEX system. The significant reoccurring process pattern occurring between the actors in the CONVEX system will be:

- Soliciting of bids
- Submission of bids
- Selection of low bid

The pattern occurs from the architect and engineers down to the building product manufacturers. The system design should take advantage of this pattern architecturally since it will yield a simpler, more robust system design. The Project will be the primary system object that is the center of all process activities.

2.1.1 Owner

Project owners can be developers (often a corporate entity) or individuals. The owner purchases land and employs the services of an architect and other consultants. An RFP may be created and distributed to one or more architects, engineers, and construction managers. The owner typically delegates the authority of day-to-day project management.

2.1.2 Construction Manager

A construction manager acts as a proxy for the owner. Some construction managers take an active role in project management and others do not. The CONVEX system will treat construction managers as a proxy for the owner.

2.1.3 Architect and Engineers (A/E)

On behalf of owners, architects and engineers design an agreed concept on existing property acquired by owners. The A/Es prepare all the plans and documents that define the project. The architect submits an RFP or instructions to bid (contained in a bid package) to engineers and general contractors. The architect generally takes responsibility for keeping a project within budget.

2.1.4 General Contractors (GCs)

GCs are the organizational force in construction projects. They are responsible for coordination of the trades and understanding plan details to ensure an accurate bid and work scope. GCs play a middleman role between the owner, architects, engineers, and subcontractors. All communication in a project flows through the GC. A GC typically responds to an RFP from an owner, construction manager, architect, or engineer. The GC will determine the required trades (CSI codes) from the plans and create a bid list (contractors) organized by trade. The GC will then send an "Invitation to Bid" to contractors on the bid list. CONVEX will provide the most value to GCs by facilitating and managing the volumes of communication that must occur between a GC and their (average 300-500) subcontractors. Use of CONVEX by GCs will help drive subs to the site.

2.1.5 Subcontractors

Subcontractors represent the critical mass in the CONVEX system because they are the single largest group of users and will be the major source of revenue for CONVEX (Phase One). The subcontractor is responsible for processing bid submissions typically from GCs. Subcontractors offer services for specific trades (CSI codes). The subcontractor often submits his own "Invitation to Bid" to other subcontractors, suppliers, and building product manufacturers. The CONVEX system must provide a simple and valuable user experience for subcontractors.

2.1.6 Suppliers

Suppliers and distributors provide products from several building product manufacturers. In many cases they provide services to contractors by finding and selecting products. Although, the building product manufacturers work with suppliers and distributors, many would prefer to have a direct relationship with contractors (increasing their margin while having a tighter control on their customer base).

2.1.7 Building Product Manufacturers (BPM)

BPMs create and sell products for one or more construction trades. The BPM is the bottom of the food chain in the construction business pyramid. The primary activity of a BPM is soliciting owners, architects, and engineers to encourage specification of their product. The secondary activity is actually responding to an "Invitation to Bid" from GCs and SCs.

2.1.8 Building Service Providers

Building service providers provide various services for contractors. These system actors will have an increasingly important role in future phases of development.

2.1.8.1 Document Reproducers (Blue printers)

Each project will have an association with one or more document reproducers. In Phase One document reproducers will be presented to contractors for informational purposes (such as, whom to pick up plans from). In later phases CONVEX will electronically distribute documents and ship documents to contractors.

2.1.8.2 Building Information Providers

Building information providers are sources of media related to trades, contractor lists, industry metrics, industry news, standards, and new projects. In Phase One, the primary role building information providers play is managing trade codes (CSI), industry news, product information, and project news (CMD).

2.2 Primary System Roles

System roles represent the key contexts a user will play within the CONVEX system. Detailing the roles is an important aspect of the CONVEX system since the business vision of the CONVEX system is to empower and change the business model of the construction business. The CONVEX system should not couple the primary system roles to any particular type of user or contractor. Any user should be able to author a project in the CONVEX system. Also, any contractor (a business selling a product or service) should be allowed to be a bid recipient for their services or product.

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2.2.1 Project Author

A project author will manage a project from all aspects. In Phase One this actor will be primarily authoring projects for bidding. This will include selecting trades and picking contractors for a bid list. The project author sends the Invitation to Bid, Scope Memo, and Addenda documents.

2.2.2 Bid Recipient (Contractor)

A bid recipient will be any contractor who is invited to bid for products or services. This will be anyone placed on a project's bid list by a project author. The bid recipient sends Request for Information (RFI) or Bid documents.

2.2.3 Bid System Administrator

A bid system administrator has the capability to modify the CONVEX account. This capability includes, but is not limited to:

- Changing company information
- Adding/changing users
- Importing bid fax data
- Managing CSI codes and lists
- Managing contractor lists

2.2.4 Portal User

A portal user is any user visiting the CONVEX site for information purposes and is not a registered user. The portal user is not a system role for the bid system.

2.3 Primary System Objects

2.3.1 Project

A project is the primary unit of work in the CONVEX system. It is the focal point of all the activity in the CONVEX system. A project brings together all the associations of bid management.

2.3.2 Bid Documents/Package

The bid documents are the initial distribution of documents from the A/Es to the GCs. They normally include plans, specifications, and instruction to bidders. The reception of this package starts the bidding process from the general contractor down the food chain.

2.3.3 Bid List

The "Bid List" represents the list of contractors who are bidding on a particular project. The "Bid List" is often referred to as the "sub list" associated with the project. This is a reference to the "subcontractors" bidding on a project.

2.3.4 Invitation to Bid Document

This document starts the bidding process by soliciting bids from contractors. The goal of submitting this document is a "Bid" representing the lowest possible cost.

2.3.5 Bid

The "Bid" is the contractual document ultimately produced in response to an "Invitation to Bid" document. It represents a contractor's agreed cost for services or products.

2.3.6 Request for Information (RFI) Document

Contractors requesting explanation or clarification of building design from A/Es create the RFI document. An addendum is often the response to a RFI.

2.3.7 Addendum Document

Whenever plans or specifications are revised or clarified, A/Es will create an addendum document detailing the change. The GC ensures that this document is sent to all trades that are impacted by the change.

2.3.8 Scope Memo Document

A scope memo document provides information to contractors to help properly bid a project. The documents may point out certain plans or design details that a contractor might overlook. The documents can play a strategic role in the bidding process

> **Example:** A contractor may choose not to send a scope memo to a contractor he suspects is bidding with a competing contractor.

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3 The Bid Management System

3.1 Portal Home Page

The portal home page is www.buzzsaw.com. This is the primary marketing vehicle and destination of non-registered users (portal users). The system must provide a dynamic page that offers all users some value that will encourage revisits and minimize drop-offs. The layout and feature set should be story boarded and scrutinized by domain experts who understand the target users. This should also be coupled with usability trials with real users.

The details of the portal site are beyond the scope of this specification, but it is expected that it will include links for the following:

- Member login
- New user registration
- Company detail (e.g. Who we are, contact information, jobs)
- Marketing (e.g. press releases, product/services description, Customer list, FAQ, industry partnerships)
- Search
- Industry resources (e.g. product database, contractor database, trade news, trade publications, related sites)
- Customer support (e.g. site tutorial, common issues, support FAQ, knowledgebase, support e-mail and telephone numbers)

3.2 Member Login

The member login screen will be the port of entry for daily/frequent users. This will be the page book-marked or placed on the users' desktops. After login, the CONVEX system will navigate users to the proper view of the system based on the user capabilities and/or role-played in the CONVEX system. Users are assigned a unique CONVEX membership ID. The ID will become an industry accepted ID and will be tied to benefits at other sites and businesses.

3.2.1 Enter Login Information

The CONVEX system will prompt users for a login name and password. Ideally, the CONVEX system should attempt to automatically determine the user by checking for Web browser cookies, or resolving user identity (by URL) presented to the CONVEX system. The bid management system will check for the existence of such a cookie and force a prompt for the user name and password if it does not exist. The password will not be echoed to the display.

3.3 Account Administration (User Registration)

Every CONVEX user will be associated with an account. The CONVEX account can be created for a sole proprietor or a corporation with several CONVEX users.

3.3.1 General Account Information

The most data-entry intensive operation in the CONVEX system is the creation of the CONVEX account. The information outlined below must be captured simply with the least possible user-labor. Fields that are optional need to be marked and the process should allow a user to revisit filling in detailed data or updating data in the future.

3.3.1.1 Membership ID

The CONVEX system will assign users unique membership IDs that will be used on the CONVEX system accepted at partner sites. The ID will become industry accepted and entitle users to special services or discounts with partner sites and companies.

3.3.1.2 Company Information

The company detail can vary slight based on company type, but ideally from a systems' viewpoint companies are treated uniformly. The system roles will drive the actual business processes in the system. The CONVEX system can use company type to make some obvious assumptions, but the CONVEX system will allow users (via profiles) to change their default view of the CONVEX system.

3.3.1.2.1 Name

This is the legal name of the company that will be used in all the public and private lists.

3.3.1.2.2 Company Type

A customer will be asked to categorize their business. While the system does not restrict what a company can do when selecting a particular company type, it is important that a company properly categorizes itself. The CONVEX system databases will be organized and presented using company type, so an erroneous classification could have significant impact to a company's visibility in the CONVEX system.

- Owner
- Construction Manager
- Architect
- Engineer
- General Contractor
- Sub-Contractor
- Supplier/Distributor
- Manufacturer

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3.3.1.2.3 Work Type (TBD- 20 to 30)

Work type will describe the type of projects that are the core competency of this contractor.

3.3.1.2.4 MWDVS

These classifications are important for qualification of contractors for certain projects:

- Minority
- Women
- Disadvantaged
- Veteran
- Small Business

3.3.1.2.5 Bidding Range

This field determines the range scope of project tackled by the contractor.

3.3.1.2.6 Address

3.3.1.2.7 Phone

3.3.1.2.8 Fax

3.3.1.2.9 E-Mail

3.3.1.2.10 URL (Web Site)

3.3.1.2.11 Contact

- Login Name
- Name
- Title
- Address
- Phone
- Fax
- E-mail

3.3.2 User Setup

Many users can be associated with a single CONVEX account. This will allow different user activity to be audited on a per project basis. The CONVEX system will also allow general capabilities to be assigned per user. The user who created the CONVEX account will become the default administrator of the CONVEX account.

3.3.2.1 Add User

The CONVEX system will allow one or more users associated with a company account.

- Define User Capabilities
  Users can be assigned different capabilities that grant access to different functionality associated with the CONVEX account.
  - Administrator

    Administrators can update CONVEX account information including adding, updating, and deleting users.
  - Allowed to Author Projects

    This capability allows users to create projects in the CONVEX system.
  - Allowed to Bid (Bidding)

    This capability allows users to create bids (respond to invitation to bid).
- Login Name
- Name
- Title
- Address
- Phone
- Fax
- E-mail
- URL

3.3.2.2 Update User

This function allows a CONVEX administrator to change a user's detail information.

3.3.2.3 Delete User

This function allows a CONVEX administrator to delete a user's login from the CONVEX system.

3.3.3 UCI/CSI Code Management (Trades)

Every contractor has traditionally maintained a version of CSI codes (trade codes) that are coupled to their internal business processes (such as, cost center). The CONVEX system will be a vehicle to encourage the adoption of uniform UCI/CSI codes.

3.3.3.1 Add CSI Codes

This function will allow a user to add custom CSI codes or select a CSI code from the CONVEX UCI/CSI list.

3.3.3.2 Edit CSI Codes

This function will allow a user to edit an existing CSI code description or number.

3.3.3.3 Delete CSI Codes

This function will allow a user to delete a CSI code from the private data.

3.3.3.4 Search CSI Codes

This function will allow a user to search for CSI codes by name or number from private and public data.

3.3.3.5 Display Zero Count CSI

This function will display all the CSI codes in private data that have no associated contractors.

3.3.3.6 Update Private to Public CSI map

This function will allow a user to update the map, which translates the private CSI code to the CONVEX UCI/CSI public data.

3.3.4 Contractor Maintenance

Maintaining contractors' lists is critical to GCs and other entities (which manage the bid process). Since the process is heavily dependent on communication to contractors, it is vital that the CONVEX system simplify the management of contractor resources.

3.3.4.1 Find Contractors

Finding contractors in the CONVEX system will be valued activity. Today GCs spend a significant amount of time searching for qualified contractors. The CONVEX system will improve the situation by giving contractors access to a public database of industry rated contractors.

3.3.4.1.1 Find Contractor in Public Data

This function will allow a CONVEX user to find a contractor based on all unique contractor attributes, and includes, but is not limited to:

- Name
- Location
- Trade
- Labor type
- Credit rating (D&B)
- Industry rating

3.3.4.1.2 Find Contractor in Private Data

This function will allow a CONVEX user to find a contractor based on all unique contractor attributes, and includes, but is not limited to:

- Name
- Location
- Trade
- Labor type
- Credit rating
- Industry rating

3.3.4.2 Add Contractor to Private Data (master list)

This function will allow a CONVEX system user to add a contractor to their private data.

3.3.4.3 Remove Contractor from Private Data

This function will allow a CONVEX system user to remove a contractor from their private data.

3.3.4.4 Contractor Lists

The CONVEX system will allow users to maintain multiple, privately named lists of contractors. These lists can share the same contractors, so the lists will be treated as references to the master private database of contractors.

> **Example:** If a contractor's phone number changes, that change is reflected in all lists that contractor appears in.

Contractor lists provide a simple tool to organize contractors. A list of contractors could exist for a particular region (such as, Riverside County Contractors) or project type (such as, Tilt-up Contractors).

3.3.4.4.1 Create Contractor List

This function allows users to create a new (named) list of contractors. After creation, this list can be used to create a unique named set of contractors.

3.3.4.4.2 Add Contractor List

This function allows users to add a contractor to a specific list. The contractor can be derived from the user's private data (master list) or the CONVEX public database.

3.3.4.4.3 Update Contractor List

This function allows a user to change contractors associated with a particular private contractor list.

3.3.4.4.4 Delete Contractor List

This function allows a user to delete a contractor list from a user's private data.

3.3.4.4.5 Find Contractor

This function allows a user to find a specific contractor in a contractor list.

3.3.4.4.6 Associate CSI Codes

This function allows a user to associate one or more CSI codes to a contractor. This activity is important in ensuring that a contractor is presented as an applicable resource during the bid authoring process.

3.3.5 Bid Fax Importation

The CONVEX system will allow users to upload BidFax .CSV files. The primary imported data elements are:

- CSI Codes
- Contractors
- Project Templates

3.3.5.1 Import CSI codes

The BidFax imported CSI codes become a user's private CSI codes. Users will be required to map the private CSI codes to the CONVEX CSI codes. The system will also offer users the option of converting their CSI codes to the CONVEX CSI codes.

3.3.5.2 Import Contractors

The BidFax imported contractors will be loaded into a user's master private database.

3.3.5.3 Import Templates

The BidFax imported project templates will be loaded into a user's master private database.

3.3.6 Membership/Paid Services

The primary vehicle to generate revenue in Phase One is contractor membership upgrades. Properly marketed, the value of upgrading to Gold Membership should be viewed as irresistible from the contractor perspective.

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3.3.6.1 Select/Upgrade Membership Level

Upgrading membership should be a visible option to users who have not upgraded their membership. This probably means that every screen might have a *click to upgrade* icon for non-upgraded users.

3.3.6.1.1 Bronze

This is a free feature that provides a basic contractor listing service. The listing will appear after Silver and Gold listings.

3.3.6.1.2 Silver

This is pay level one and provides some value in positioning over Bronze level contractors. The contractor listing will appear after Gold listings.

3.3.6.1.3 Gold

This is pay level two and provides value in positioning over Bronze and Silver level contractors. The contractor listing will appear in the top group of contractor Gold listings.

3.3.6.2 Buy Extra Faxing Units

A user is allocated "N" free faxes per month. If a user exceeds "N" faxes, they can buy 1000 faxes (a fax unit) for $150.00.

3.3.6.3 Secure Purchase Transaction

A user will be prompted on a secure page (made very obvious) for credit card information. The CONVEX system will prompt for the minimum fields required for a credit transaction with a merchant bank. A simple, secure form will be used that describes what is being purchased. Upon transaction completion a landing page will be presented with an order number. The landing page will be printable.

3.3.7 Account Preferences

User customization of system defaults. While some preferences are obvious today, due to the nature of system user interface design and development, it is believed that the definition of preferences may be driven by design of user interface and the system itself.

3.3.7.1 Publish Bid Awards

By default publish all bid awards.

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3.3.7.2 Publish Contractor Lists

By default publish bid lists.

3.3.7.3 Publish Document Reproducers

By default publish a project's blue printers.

3.4 Project Authoring

Project Authoring is the system activity that starts the bidding business process. The interesting aspect of the business process is the recursive nature of the process. The root process occurs when the owner/developer submits an RFP to A/Es. The A/Es submit an RFP and/or bid documents to GCs who, in turn, submit an invitation to bid to subcontractors, suppliers/wholesalers, and BPMs. The cycle repeats at every level.

3.4.1 Create Project from another Project or Project Document

When a contractor receives an invitation to bid from another contractor an automatic association is made to a project. A contractor can pull the list of associated projects or documents and create a new project.

3.4.2 Create Project from Template

The CONVEX system will provide a function that will allow the initial state of a project to be derived from a previously saved project template. Every project can be saved as a template. Project templates are a tool to reuse common data attributes between projects. A contractor may want to reuse the CSI codes (trades) or the contractors of previous project.

3.4.3 Project Definition

Capture the detail, which will uniquely identify and describe a project.

3.4.3.1 Details

The items in the following items define a project. The bulk of the information captured should not be mandatory. The minimum information required to define a project should be small and obvious to the project author. Keeping the use-cost of the CONVEX system to a minimum will be a key factor in user retention. The CONVEX system use experience needs to be perceived as worthwhile. Excessive data entry could easily become a barrier towards mass adoption of the CONVEX system.

- Title
  The title is the primary legal description of the project.
- Location
- Bid Date and Time

- Owner Information
- Architect Information
- Consultant Information
- Bidding Information
- Type of Project
- Project Estimated Valuation
- Scope of work description
- Document Reproducer

3.4.4 Bid Type

Bid type will be used for categorization, driving some business logic differently depending on the project context.

3.4.4.1 Public Works (City/State/Federal Government)

Public works projects are open to everyone that qualifies to bid the project. These projects often mandate equal opportunity employment. Canada does not have equal opportunity employment issues. These projects may require tracking of MWDVS attributes.

3.4.4.2 Private Competitive Bid

In the case where more than one general contractor is bidding on a project with private ownership it is a private competitive bid type. Union labor may be required due to loan requirements from union based institutions. Prevailing wages may be required if a portion of the funds come from a government-funded program.

3.4.4.3 Negotiated Bid

Negotiated bid is becoming the popular choice in the commercial construction business. The owner will entrust the project with a single general contractor. The GC will manage the bidding process by soliciting bids from subcontractors and suppliers. Union labor may be required if a union lending institution is involved. Prevailing wages may be required if a portion of the funds come from a government-funded program.

3.4.5 Labor Type

Labor type defines employee guidelines for pay and other legal considerations.

3.4.5.1 Prevailing Wage

Wages are determined to meet government prevailing wage guidelines.

3.4.5.2 *Union Wage*

Wages are determined to meet union guidelines.

3.4.5.3 *Open Shop*

Wages can be determined per contractor and are not constrained by union or prevailing wages.

3.4.5.4 *Unknown*

When the labor type cannot be determined, the CONVEX system will categorize.

3.4.6 Select Trades

The project plans include a list of trades, which help define the list of required trades. Experienced contractors review projects plans to further refine the list of trades to help ensure a successful bid.

3.4.6.1 *Trade selection (private CSI codes)*

The CONVEX system will have a simple tree model for selection of CSI codes and association to a project.

3.4.7 Select Contractors

Select contractors based on selected trades from specific contractor list. The system will prompt contractors in private data space and public data space. Normally a single contractor list is selected per project. The CONVEX system will transparently map the CONVEX user's private CSI codes to the CONVEX system CSI codes.

3.4.7.1 *Contractor selection using Private Data*

The CONVEX system will prompt for CSI codes from the user's private data.

3.4.7.2 *Contractor selection using Public Data*

The CONVEX system will prompt for CSI codes from the CONVEX public data. Contractors will be selected by their trade and profile. The system will also optionally add the contractor to a private contractor list.

3.4.7.3 *Select Bid Recipients*

This function allows a contractor to be selective of whom in the associated project will get a particular document.

3.4.8 Project Preferences

Project preferences, which allow overriding of account defaults.

3.4.8.1 Publish Bid List

Publish this projects bid list to the public database.

3.4.8.2 Publish Bid Award

Publish this projects bid award to the public database.

3.4.8.3 Publish Document Reproducers

Publish project's blue printers to the public database.

3.4.9 Save Project as Template

The CONVEX system will provide a function to save a snapshot of a project as a template. This will allow future re-use of project settings, CSI codes, and contractors.

3.5 Document Management

Document management is the focal point of communication in the CONVEX system. All parties in the CONVEX system will formally communicate via document exchange. Timely routing and delivery of important documents will be a critical requirement.

3.5.1 Create Document

This function allows a contractor to create documents for delivery to other CONVEX users. The correspondence can be project-centric or general correspondence outside a project context.

3.5.1.1 Create New Document

Allows a contractor to create documents supporting the project-authoring role.

3.5.1.1.1 Invitation To bid

This document is created relative to a project and once for a project. The CONVEX system will track which contractors of the project have been sent this document.

3.5.1.1.2 Addendum

This document is created as needed during the project bidding process. The recipients may vary based on trades. The CONVEX system will track who has received this document.

3.5.1.1.3 Scope Memo

A scope memo is created when more information is needed to clarify the project plan/specifications for a particular trade. This helps the contractors prepare a better bid

3.5.1.1.4 Memo

A memo is any general correspondence that is not formally modeled.

3.5.1.2 Re-Send Previous Document

As contractors are removed and added to a project, the CONVEX system must allow previous documents to be re-sent to new contractors. The system will track and allow re-selection of previously sent documents.

3.5.2 Select Recipients

Selecting the recipients will be similar to selecting e-mail contacts.

3.5.3 Send Document

The CONVEX system will allow contractors to send documents using a single click operation (the default method is a facsimile). Another method may be chosen. The method applies to all selected recipients.

3.5.3.1 Fax

Send a document via CONVEX system FAX services.

3.5.3.2 Print for Faxing

Print a document in the browser using a format that is faxable.

3.5.3.3 CONVEX E-mail

Send a document using the internal CONVEX document delivery service.

3.5.3.4 Internet E-Mail

Send a document via SMTP service with some acknowledgement of receipt.

3.5.4 Fax Capture Documents

The CONVEX system will allow a user to send faxes to the CONVEX system to be associated to a project, or to appear in a Project In Box. (This functionality may be added after phase 1).

3.5.4.1 Print Bar Code for FAX capture

The CONVEX system will allow a user to print a bar code page that will help identify the incoming fax document.

3.5.4.2 Add Captured Documents To Project

Faxes that are captured will be routed to the CONVEX system and added to the associated project.

3.5.4.3 Associate Pages to Trades

The CONVEX system will allow a user to associate individual pages to trades.

3.6 Bid Management

Bidding is the process where a contractor responds to an invitation to bid.

3.6.1 Search for Projects

Search for new bidding opportunities. The CONVEX system will provide simple and flexible ways to search for new projects to bid. This functionality is a key value to subcontractors and suppliers.

3.6.1.1 Search for new projects

Based on the CONVEX contractor profile, the CONVEX system will find new bidding opportunities. The system will allow a contractor to send a memo soliciting a bid opportunity.

3.6.1.2 Search for projects near my area

The CONVEX system will allow a contractor to search for bidding opportunities outside of his defined work area.

3.6.2 View Projects

The contractor will view correspondence categorized at two levels: By document type and by project.

3.6.2.1 Inbox

The inbox is organized by project. Urgent documents like "Addendum" causes a display alert to appear which a user can click on.

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3.6.2.1.1 Addendum (alterable)

This document is important to the contractor because it represents a modification to specifications or plans, which are critical to the bidding of the project. These documents must be available to a contractor in a timely manner. The CONVEX system will actively alert a contractor when a new addendum arrives.

3.6.2.1.2 Invitation to Bids

Receiving the invitation to bid is the beginning of the bid process for a contractor. This document represents potential business and the CONVEX system needs to empower contractors to solicit invitations to bid every project applicable to the contractor.

3.6.2.1.3 Scope Memo

A scope memo is normal information provided by the GC to help the contractor in his bidding process.

3.6.2.1.4 CONVEX Project Mail

General correspondence associated with a project.

3.6.2.1.5 CONVEX Mail

General CONVEX system e-mail.

3.6.3 Response to Document

Responding to received documents will be simple using the CONVEX system. Users will be presented with documents in an organized inbox with a status, which shows *read* and *responded.*

3.6.3.1 Select Document Type

The CONVEX system will exploit the common e-mail user interface pattern when handling a project's formal correspondence. Documents will be organized by type in the main inbox folder. A count of new documents will appear next to the folder name. Documents will be organized in folders by project. This interface will be a unique feature of the CONVEX system and will evolve as more is learned from prototyping and usability reviews.

3.6.3.1.1 Bid/Decline

This document will normally be created in response to an invitation to bid.

3.6.3.1.2 RFI

This document will normally be created in response to an invitation to bid, scope memo, and addendum.

3.6.3.2 Send Response

Documents are automatically routed to the project author. Guaranteed receipt is not possible with all document delivery methods.

3.6.3.2.1 Fax

CONVEX system sends the document as a FAX.

3.6.3.2.2 Print for Faxing

CONVEX system prepares output for printing that will be faxed.

3.6.3.2.3 CONVEX E-Mail

The CONVEX system delivers mail directly to a CONVEX users inbox.

3.6.3.2.4 Internet E-Mail

The CONVEX system uses Internet e-mail SMTP to deliver documents.

3.6.4 Create Document

This function allows a contractor to create documents for delivery to other CONVEX users. The correspondence can be project-centric or general correspondence outside a project context.

3.6.4.1 Select Document Type

The contractor should have one-click access to any common function. The ability to create documents should be designed to facilitate ad hoc workflow.

3.6.4.1.1 RFI

A contractor can author an RFI when there is an issue, or if clarification of plans/specifications is required.

3.6.4.1.2 Memo

A memo is any general correspondence not formally modeled. This can be used for bidding inquiry, sales solicitation, and so on.

3.6.4.2 Select Recipients

Selecting the recipients will be similar to selecting e-mail contacts. The CONVEX system should also allow a contractor to select a project as a destination, which would imply the project's project manager.

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3.6.4.3 Send Document

The CONVEX system will allow contractors to send documents using a single click operation. The default method is a facsimile, although another method can be chosen. The method applies to all selected recipients.

3.6.4.3.1 Fax

Send a document via CONVEX system FAX services.

3.6.4.3.2 Print for Faxing

Print a document in the browser using a format that is faxable.

3.6.4.3.3 CONVEX E-mail

Send a document using the internal CONVEX document delivery service.

3.6.4.3.4 Internet E-Mail

Send a document via SMTP service with some acknowledgement of receipt.

3.7 Calendar

The Calendar is a Web-based calendar that offers PIM-like functionality to registered users. This could be a co-branded site offering Web-based PIM service. Some opportunity exists to customize functionality to tightly integrate into the CONVEX system/projects associated with the user.

> **Example:** Bid submission dates could appear on the calendar and in *to do* lists. Similar to http://www.hotoffice.com (This functionality may be added after phase 1).

3.8 Reporting

Produce reports about contractors (and suppliers/BPM), project metrics/statistics, user metrics, and fax activity. Reports can be printed, faxed, and e-mailed.

3.8.1 UCI/CSI Report

3.8.2 Contractor Report

- Address Report
- Mini Profile
- Profile
- Phone List by UCI/CSI
- Comments

3.8.3 Bid Report

- Bid Tab Report
- Bid Call Report from A-Z
- Bid Call Report by UCI/CSI Code
- Bid Summary Report
- Plans Transmittal Special Instructions Cover Sheet

3.8.3.1 User Activity

- User Summary
- User Audit Trail

3.8.3.2 Fax Activity

- Fax Summary
- Fax Audit by Contractor
- Fax History by Contractor
- Fax status by Contractor

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4 Glossary

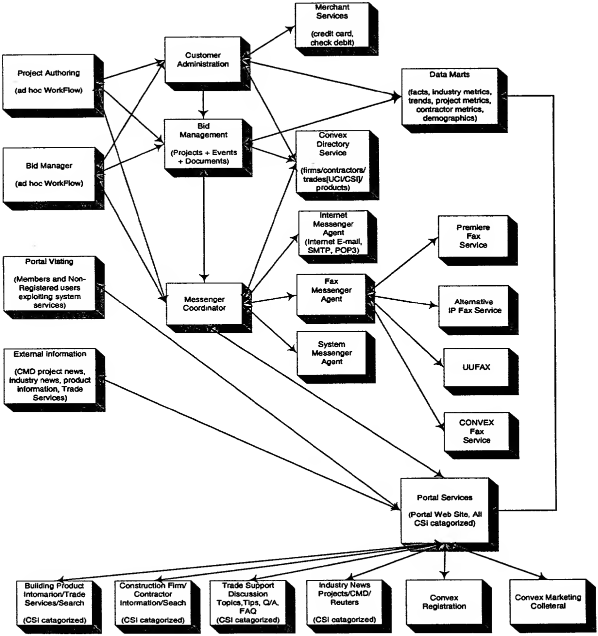
Term	Definition
Addendum	This document contains information relating to official changes in the bid.
Architects/Engineers (A/E)	Architects and Engineers
Architect	This primary actor has information and functionality specific to architecture company.
Building Product Manufacturer (BPM)	Building Product Manufacturer
Construction Manager	A professional who normally acts as a proxy for the owner or developer of a project.
CSI codes (UCI/CSI Code)	Construction Standards Institute–numeric codes which classify construction trades
Engineer	This primary actor has information and functionality specific to an engineering company.
General Contractor (GC)	This primary actor has information and functionality specific to a general contractor company.
Invitation to Bid	This is a document that details an invitation to certain parties to bid on a project.
Owner	This primary actor has information and functionality specific to an engineering company.
Plan	This unstructured document represents the basic plan for a project.
Project	This abstract class organizes the basic data and functionality of a project. This takes the trade classifications and company listings and uses them to send out documents to lists of recipients.
Request for Information (RFI)	This document represents a request for information that is passed from an SC to a GC, or from a GC to an Architect or Engineer.
Request for Proposal (RFP)	This document represents a request for proposal. This document is created by owners/developers and distributed to one or more architects and engineers.
Scope Memo	This document represents an unofficial change, or a suggested approach to a project.
Specification	This unstructured document represents the detailed specifications of a project.
Subcontractor	This primary actor has information and functionality specific to a subcontractor company.
Supplier/BPM/Blue Printer	This represents a registered company that does not need to store special information.
Trade	This refers to a particular building trade, such as a CSI code.

5 System Design

5.1 Overview

The system design leverages some common reoccurring patterns in the bidding business processes, and ultimately facilitates communication between business entities in a semi-structured manner. The design focuses on the collaboration of objects to facilitate communication.

Figure 2: Convex Architecture Overview



5.2 Significant Business Events

The majority of the system's business rules come into play when events occur in a system. What follows are the primary events the CONVEX system will manage in Phase One.

5.2.1 New Project

This event will be realized when a project author creates a new construction project in the CONVEX system. In Phase One this activity will primarily occur to facilitate the bidding process. In subsequent phases the activity will play a more significant role in the system's business logic. eBuilt envisions a new project being published to internal and external systems, as well as external systems publishing new projects into the bid management system.

5.2.2 Invitation To Bid

This event occurs when a project author submits an invitation to bid to contractors.

5.2.3 Request for Information (RFI)

This event occurs when a contractor submits an RFI to a project author. The project author will often respond with an addendum.

5.2.4 Addenda

This event occurs when a project author submits an addendum to contractors associated to a project. This event is often associated with a previous RFI event.

5.2.5 Scope Memo

This event occurs when a project author submits a scope memo document to contractors associated with a project.

5.2.6 Bid Submission

This event occurs when a contractor responds to an invitation to bid event. A bid is a statement representing the cost for goods and services.

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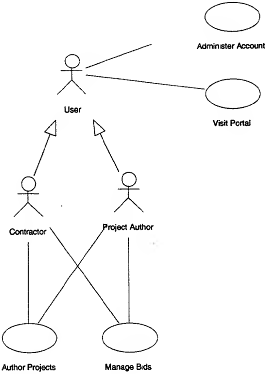
5.3 USE-Cases

5.3.1 Overview—Roles



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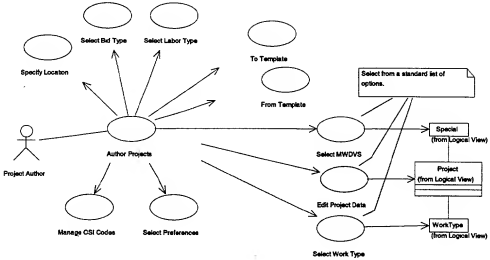
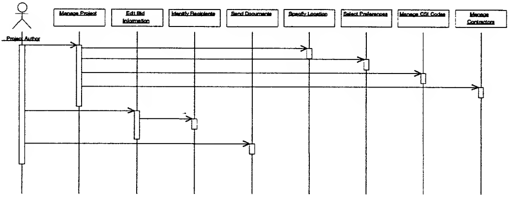
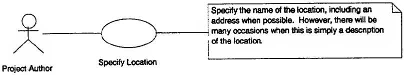
5.3.2 Author Projects



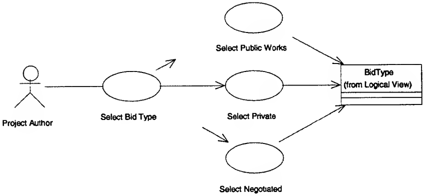
5.3.3 Author Project Interaction Diagram



5.3.4 Specify Location



5.3.5 Select Bid Type



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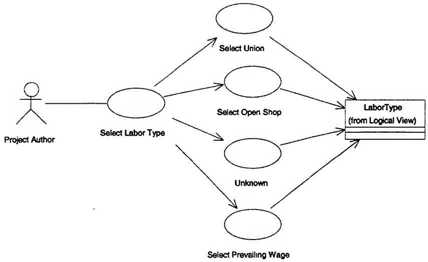
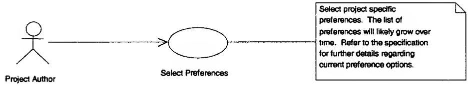
5.3.6 Select Labor Type

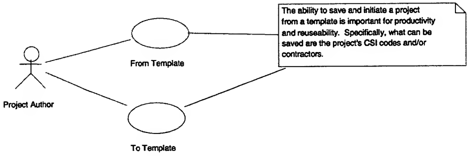


5.3.7 Select Preferences



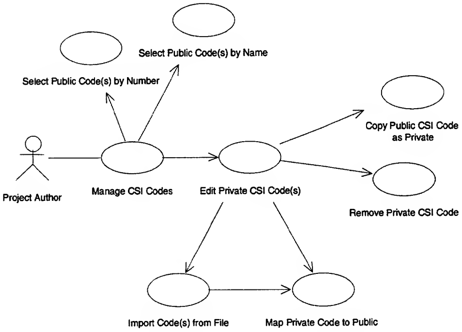
Select project specific preferences. The list of preferences will likely grow over time. Refer to the specification for further details regarding current preference options.

5.3.8 From/To Template

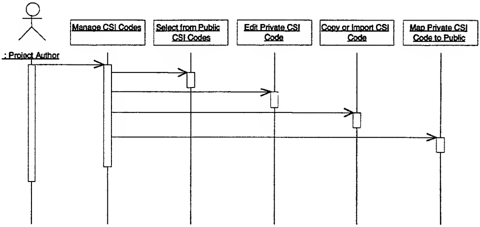


The ability to save and initiate a project from a template is important for productivity and reuseability. Specifically, what can be saved are the project's CSI codes and/or contractors.

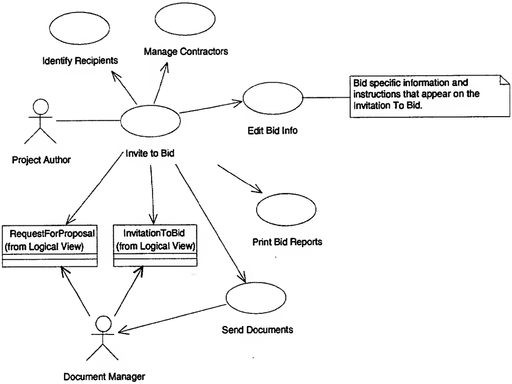
5.3.9 Manage CSI Codes



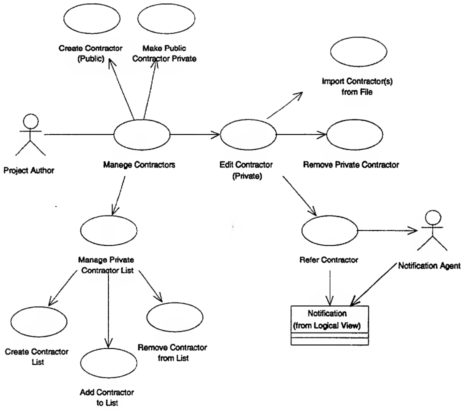
5.3.10 Manage CSI Codes Interaction Diagram



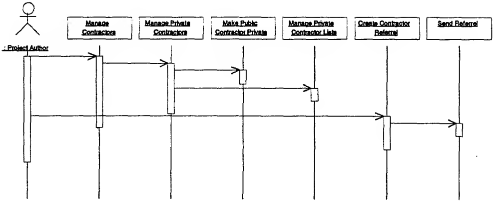
5.3.11 Invitation To Bid



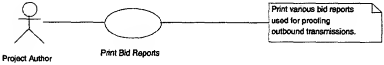
5.3.12 Manage Contractors



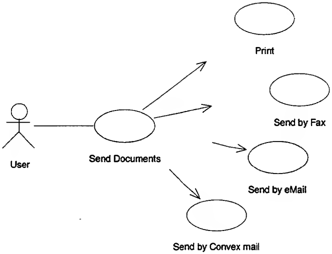
5.3.13 Manage Contractors Interaction Diagram



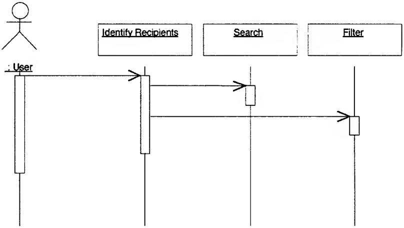
5.3.14 Print Bid Reports



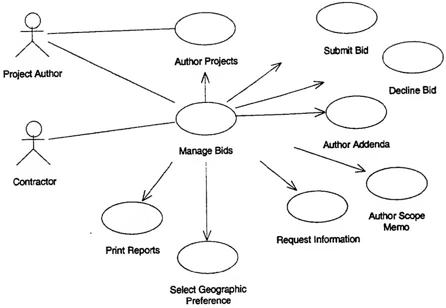
5.3.15 Send Documents



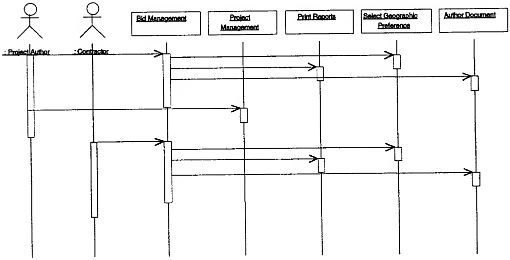
5.3.16 Identify Recipients Interaction Diagram



5.3.17 Manage Bids



5.3.18 Bid Management Interaction Diagram



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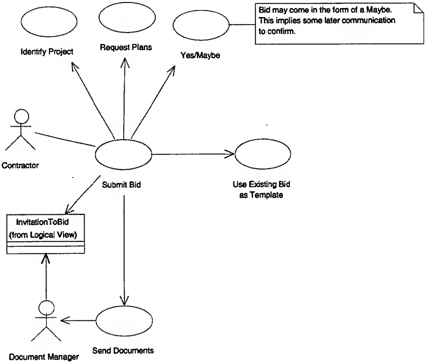
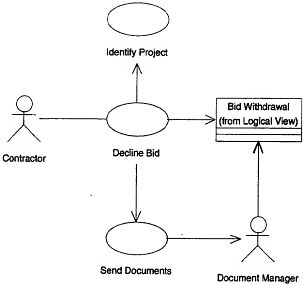
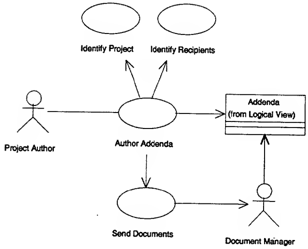
5.3.19 Submit Bid



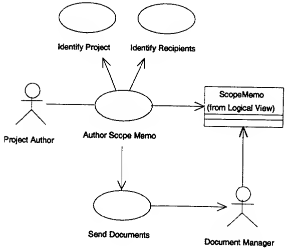
5.3.20 Decline Bid



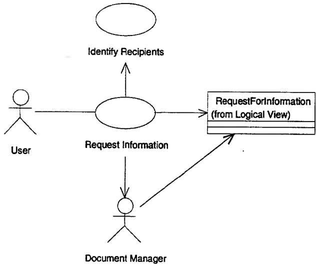
5.3.21 Author Addenda



5.3.22 Author Scope Memo



5.3.23 Request Information



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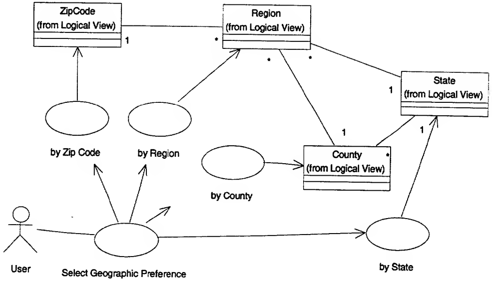
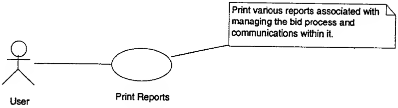
5.3.24 Select Geographic Preference



5.3.25 Print Reports



Print various reports associated with managing the bid process and communications within it.

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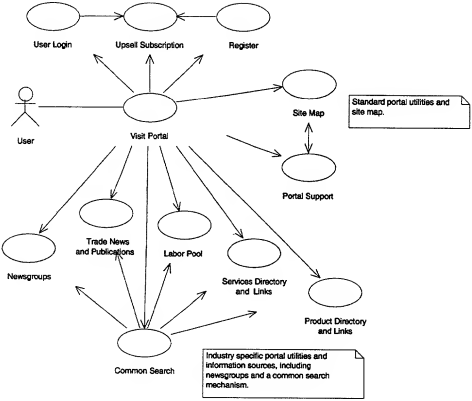
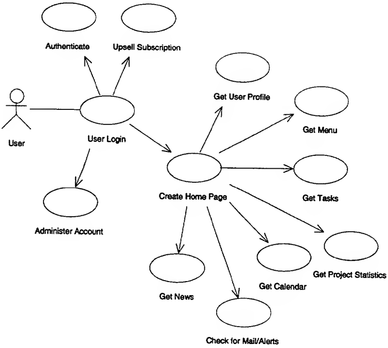
5.3.26 Visit Portal



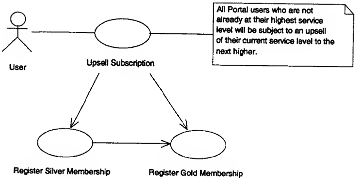
Standard portal utilities and site map.

Industry specific portal utilities and information sources, including newsgroups and a common search mechanism.

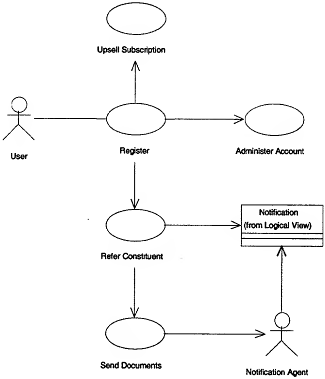
5.3.27 User Login



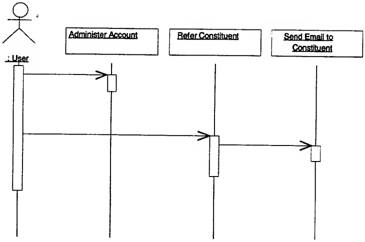
5.3.28 Upsell Subscription



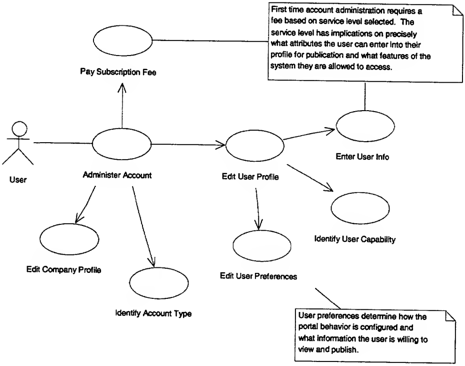
5.3.29 Register



5.3.30 Register Interaction Diagram



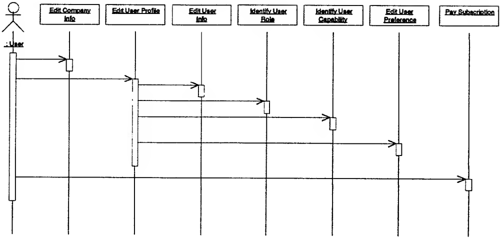
5.3.31 Administer Account



First time account administration requires a fee based on service level selected. The service level has implications on precisely what attributes the user can enter into their profile for publication and what features of the system they are allowed to access.

User preferences determine how the portal behavior is configured and what information the user is willing to view and publish.

5.3.32 Administer Account Interaction Diagram



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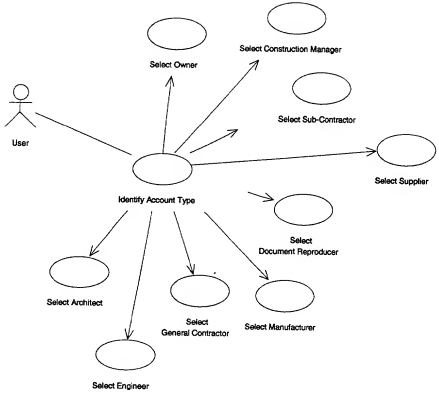
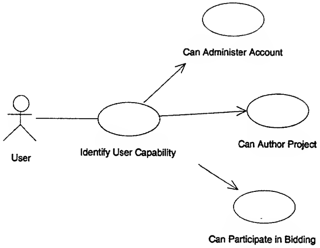
5.3.33 Identify Account Type



5.3.34 Identify User Capability



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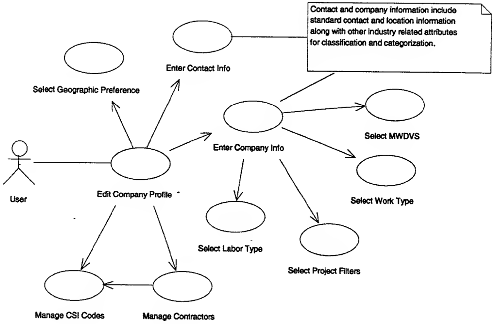
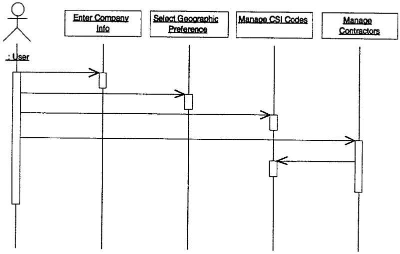
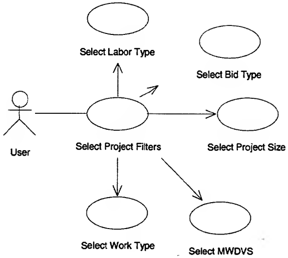
5.3.35 Edit Company Profile



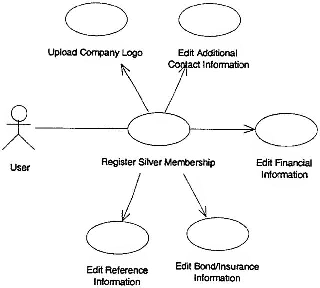
5.3.36 Edit Company Info. Interaction Diagram



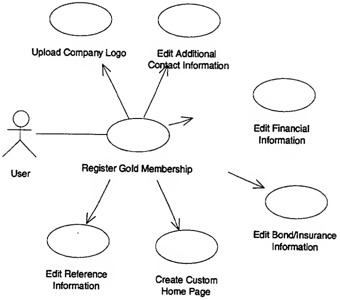
5.3.37 Select Project Filters



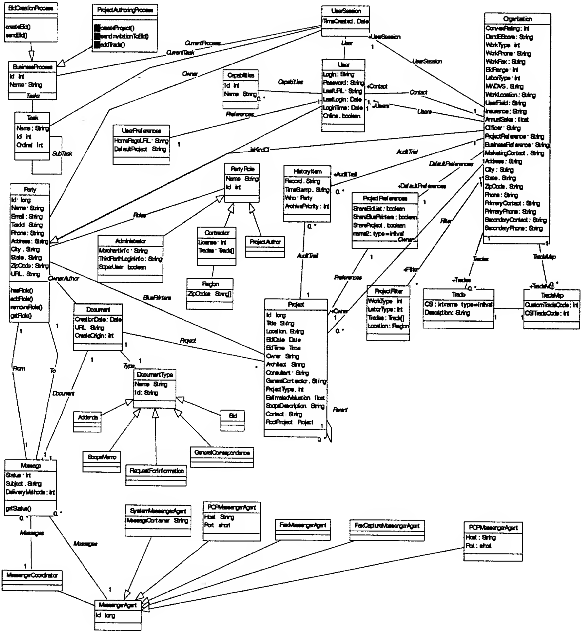
5.3.38 Register Silver Membership



5.3.39 Register Gold Membership



5.3.40 Object Model Overview



eBuilt

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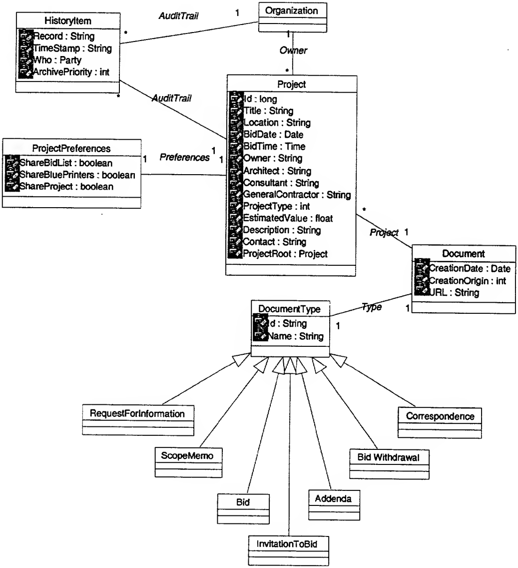
5.3.41 Project Object Model



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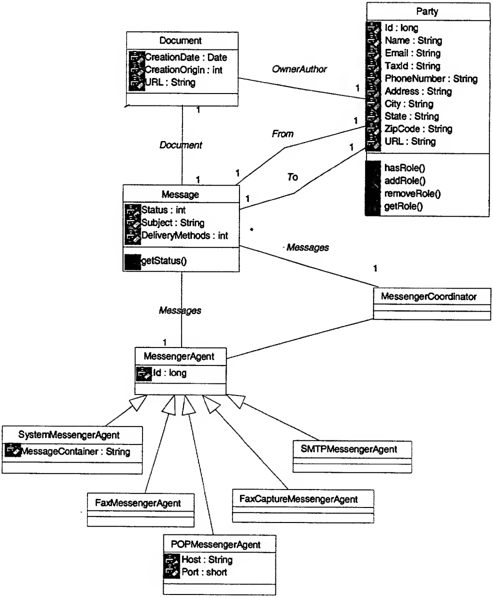
5.3.42 Document Object Model



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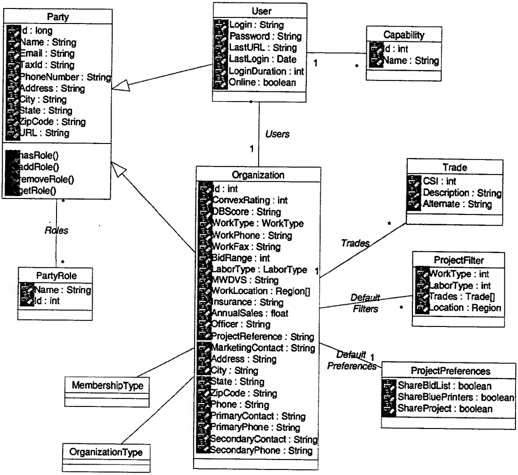
5.3.43 Company Object Model



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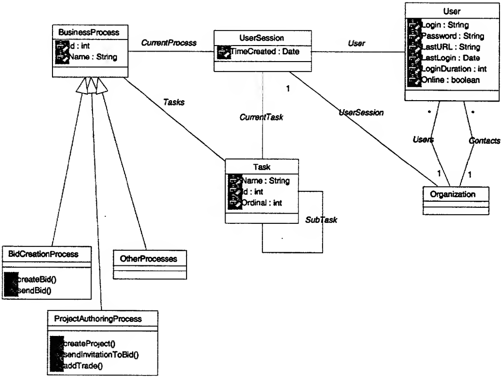
5.3.44 Session Object Model



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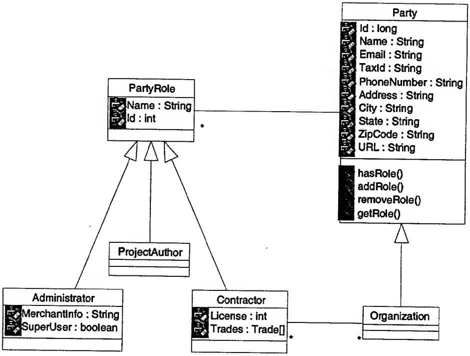
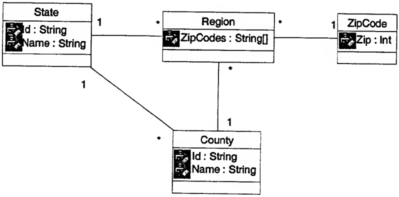
5.3.45 Roles Object Model



5.3.46 Region Object Model



5.4 Business Objects (Object Model)

This outline represents the first design cycle. It is expected that the object model will evolve with subsequent implementation and design cycles. The primary key system objects are outlined with significant relationships detailed.

5.4.1 Domain Object Model

5.4.1.1 Private Attributes:

Object Name	Object Type
CreationDate	Date
CreationOrigin	int
URL	String

5.4.2 Bid Withdrawal

5.4.2.1 Derived from ProjectDocument, DocumentType

5.4.3 InvitationToBid

5.4.3.1 Derived from ProjectDocument, DocumentType

5.4.4 Project

5.4.4.1 Private Attributes:

Object Name	Object Type
Id	long
Title	String
Location	String
BidDate	Date
BidTime	Time
Owner	String
Architect	String
Consultant	String
GeneralContractor	String
ProjectType	int
EstimatedValue	float
Description	String
Contact	String

Object Name	Object Type
ProjectRoot	Project

5.4.5 ProjectDocument

5.4.5.1 Derived from Document

5.4.6 Vendor

5.4.6.1 Derived from UserRole

5.4.7 ScopeMemo

5.4.7.1 Derived from ProjectDocument, DocumentType

5.4.8 Plan

5.4.8.1 Derived from ProjectDocument

5.4.9 Specification

5.4.9.1 Derived from ProjectDocument

5.4.10 Addenda

5.4.10.1 Derived from ProjectDocument, DocumentType

5.4.11 RequestForInformation

5.4.11.1 Derived from ProjectDocument, DocumentType

5.4.12 RequestForProposal

5.4.12.1 Derived from ProjectDocument

5.4.13 Correspondence

5.4.13.1 Derived from ProjectDocument, DocumentType

5.4.14 UserRole

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5.4.15 User

5.4.15.1 Derived from Party

5.4.15.2 Private Attributes:

Object Name	Object Type
Login	String
Password	String
LastURL	String
LastLogin	Date
LoginDuration	int
Online	boolean

5.4.16 ProjectAuthor

5.4.16.1 Derived from UserRole, PartyRole

5.4.17 SpecialCategory

5.4.18 WorkType

5.4.19 TradeCode

5.4.20 LaborType

5.4.21 BidType

5.4.22 Region

5.4.22.1 Private Attributes:

Object Name	Object Type
ZipCodes	String[]

5.4.23 State

5.4.23.1 Private Attributes:

Object Name	Object Type
Id	String
Name	String

5.4.24 ZipCode

5.4.24.1 Private Attributes:

Object Name	Object Type
Zip	int

5.4.25 County

5.4.25.1 Private Attributes:

Object Name	Object Type
Id	String
Name	String

5.4.26 Notification

5.4.27 Organization

5.4.27.1 Derived from Party

5.4.27.2 Private Attributes:

Object Name	Object Type
Id	int
ConvexRating	int
DBScore	String
WorkType	WorkType
WorkPhone	String
WorkFax	String
BidRange	int
LaborType	LaborType

Object Name	Object Type
MWDVS	String
WorkLocation	Region[]
Insurance	String
AnnualSales	float
Officer	String
ProjectReference	String
MarketingContact	String
Address	String
City	String
State	String
ZipCode	String
Phone	String
PrimaryContact	String
PrimaryPhone	String
SecondaryContact	String
SecondaryPhone	String

5.4.28 Contact

5.4.29 Profile

5.4.30 Contractor

5.4.30.1 Derived from OrganizationType, PartyRole

5.4.30.2 Private Attributes:

Object Name	Object Type
License	int
Trades	Trade[]

5.4.31 MembershipType

5.4.32 ProjectProfile

5.4.33 Location

PRINT OF DRAWINGS
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5.4.34 Capability

5.4.34.1 Private Attributes:

Object Name	Object Type
Id	int
Name	String

5.4.35 OrganizationType

5.4.36 DocumentList

5.4.37 BidList

5.4.38 Party

5.4.38.1 Private Attributes:

Object Name	Object Type
Id	long
Name	String
Email	String
TaxId	String
PhoneNumber	String
Address	String
City	String
State	String
ZipCode	String
URL	String []

5.4.38.2 Public Operations:

Object Method Name	Object Parameter Type	Object Return Type
hasRole	Void	Void
addRole	Void	Void
removeRole	Void	Void
getRole	Void	Role

5.4.39 DocumentType

5.4.39.1 Private Attributes:

Object Name	Object Type
Id	String
Name	String

5.4.40 Message

5.4.40.1 Private Attributes:

Object Name	Object Type
Status	int
Subject	String
DeliveryMethods	int

5.4.40.2 Public Operations:

Object Method Name	Object Parameter Type	Object Return Type
getStatus ()	Void	int

5.4.41 Messenger

5.4.42 Role

5.4.43 Administrator

5.4.43.1 Derived from PartyRole

5.4.43.2 Private Attributes:

Object Name	Object Type
MerchantInfo	String
SuperUser	boolean

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5.4.44 POPMessengerAgent

5.4.44.1 Derived from MessengerAgent

5.4.44.2 Private Attributes:

Object Name	Object Type
Host	String
Port	short

5.4.45 FaxMessengerAgent

5.4.45.1 Derived from MessengerAgent

5.4.46 SystemMessengerAgent

5.4.46.1 Derived from MessengerAgent

5.4.46.2 Private Attributes:

Object Name	Object Type
MessageContainer	String

5.4.47 ProjectAuthoringProcess

5.4.47.1 Derived from BusinessProcess

5.4.47.2 Public Operations:

Object Method Name	Object Parameter Type	Object Return Type
createProject	Project	Project
sendInvitationToBid	Project	boolean
addTrade	Trade	Void

5.4.48 BidCreationProcess

5.4.48.1 Derived from BusinessProcess

5.4.48.2 Public Operations:

Object Method Name	Object Parameter Type	Object Return Type
createBid	Void	Void
sendBid	Void	Void

5.4.49 FaxCaptureMessengerAgent

5.4.49.1 Derived from MessengerAgent

5.4.50 MessengerCoordinator

5.4.51 MessengerAgent

5.4.51.1 Private Attributes:

Object Name	Object Type
Id	long

5.4.52 GeneralCorrespondance

5.4.52.1 Derived from DocumentType

5.4.53 Bid

5.4.53.1 Derived from DocumentType

5.4.54 PartyRole

5.4.54.1 Private Attributes:

Object Name	Object Type
Name	String
Id	int

PRINT OF DRAWINGS
AS ORIGINALLY FILED

5.4.55 UserPreferences

5.4.55.1 Private Attributes:

Object Name	Object Type
HomePageURL	String
DefaultProject	String

5.4.56 Capabilities

5.4.56.1 Private Attributes:

Object Name	Object Type
Id	int
Name	String

5.4.57 ProjectFilter

5.4.57.1 Private Attributes:

Object Name	Object Type
WorkType	int
LaborType	int
Trades	Trade[]
Location	Region

5.4.58 HistoryItem

5.4.58.1 Private Attributes:

Object Name	Object Type
Record	String
TimeStamp	String
Who	Party []
ArchivePriority	int
Record	String
TimeStamp	String
Who	Party
ArchivePriority	int

5.4.59 ProjectPreferences

5.4.59.1 Private Attributes:

Object Name	Object Type
ShareBidList	boolean
ShareBluePrinters	boolean
ShareProject	boolean []

5.4.60 Trade

5.4.60.1 Private Attributes:

Object Name	Object Type
CSI	int
Description	String
Alternate	String []

5.4.61 TradeMap

5.4.61.1 Private Attributes:

Object Name	Object Type
CustomTradeCode	int
CSITradeCode	int

5.4.62 BusinessProcess

5.4.62.1 Private Attributes:

Object Name	Object Type
id	int
Name	String

5.4.63 UserSession

A unit of work.

5.4.63.1 Private Attributes:

Object Name	Object Type
TimeCreated	Date

5.4.64 Task

5.4.64.1 Private Attributes:

Object Name	Object Type
Name	String
Id	int
Ordinal	int

5.4.65 SMTPMessengerAgent

5.4.65.1 Derived from MessengerAgent

5.4.66 OtherProcesses

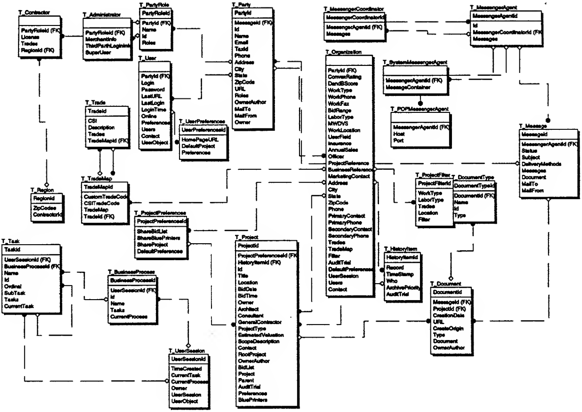
5.4.66.1 Derived from BusinessProcess

5.5 Physical System Design

5.6 Data Architecture

Below is the first design of the database schema. As the object model evolves the schema will change and additional implementation level tables will appear (such as, join tables). It is also expected that database architects will optimize and refine the schema during development.

5.6.1 Schema Model



5.6.2 Logical Entity/Attributes Overview

Entity Name	Entity Logical Only	Entity Attribute Name	Entity Attribute Logical Only
T_Administrator	No	MerchantInfo	No
		ThirdPartyLoginInfo	
		SuperUser	
T_BusinessProcess		BusinessProcessId	
		id	
		Name	
		Tasks	
		CurrentProcess	
T_Contractor		Trades	
		RegionId	
		License	
T_Document		DocumentId	
		CreationDate	

Entity Name	Entity Logical Only	Entity Attribute Name	Entity Attribute Logical Only
		URL	
		CreateOrigin	
		Type	
		Document	
		OwnerAuthor	
T_DocumentType		DocumentTypeId	
		Name	
		Id	
		Type	
T_HistoryItem		HistoryItemId	
		Record	
		TimeStamp	
		Who	
		ArchivePriority	
		AuditTrail	
T_Message		MessageId	
		Status	
		Subject	
		DeliveryMethods	
		Messages	
		Document	
		MailTo	
		MailFrom	
T_MessengerAgent		MessengerAgentId	
		Id	
		MessengerCoordinatorId	
		Messages	
T_MessengerCoordinator		MessengerAgentId	
		Messages	
		MessengerCoordinatorId	
T_Organization		ConvexRating	
		DandBScore	
		WorkType	
		WorkPhone	
		WorkFax	
		BidRange	
		LaborType	

Entity Name	Entity Logical Only	Entity Attribute Name	Entity Attribute Logical Only
		MWDVS	
		WorkLocation	
		UserField	
		Insurance	
		AnnualSales	
		Officer	
		ProjectReference	
		BusinessReference	
		MarketingContact	
		Address	
		City	
		State	
		ZipCode	
		Phone	
		PrimaryContact	
		PrimaryPhone	
		SecondaryContact	
		SecondaryPhone	
		Trades	
		TradeMap	
		Filter	
		AuditTrial	
		DefaultPreferences	
		UserSession	
		Users	
		Contact	
T_Party		PartyId	
		Id	
		Name	
		Email	
		TaxId	
		Phone	
		Address	
		City	
		State	
		ZipCode	
		URL	

PRINT OF DRAWINGS
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Entity Name	Entity Logical Only	Entity Attribute Name	Entity Attribute Logical Only
		Roles	
		OwnerAuthor	
		MailTo	
		MailFrom	
		Owner	
T_PartyRole		PartyRoleId	
		Name	
		Id	
		Roles	
T_POPMessengerAgent		Host	
		Port	
T_Project		ProjectId	
		Id	
		Title	
		Location	
		BidDate	
		BidTime	
		Owner	
		Architect	
		Consultant	
		GeneralContractor	
		ProjectType	
		EstimatedValuation	
		ScopeDescription	
		Contact	
		RootProject	
		OwnerAuthor	
		BidList	
		Project	
		Parent	
		AuditTrial	
		Preferences	
		BluePrinters	
T_ProjectFilter		ProjectFilterId	
		WorkType	
		LaborType	
		Trades	

PRINT OF DRAWINGS
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Entity Name	Entity Logical Only	Entity Attribute Name	Entity Attribute Logical Only
		Location	
		Filter	
T_ProjectPreferences		ProjectPreferencesId	
		ShareBidList	
		ShareBluePrinters	
		ShareProject	
		DefaultPreferences	
T_Region		RegionId	
		ZipCodes	
		ContractorId	
T_SystemMessengerAgent		MessageContainer	
T_Task		TaskId	
		Name	
		Id	
		Ordinal	
		SubTask	
		Tasks	
		CurrentTask	
T_Trade		Description	
		Trades	
		TradeMapId	
		CSI	
		TradeId	
T_TradeMap		CSITradeCode	
		TradeMap	
		TradeId	
		CustomTradeCode	
		TradeMapId	
T_User		Login	
		Password	
		LastURL	
		LastLogin	
		LoginTime	
		Online	
		Preferences	
		Users	
		Contact	

Entity Name	Entity Logical Only	Entity Attribute Name	Entity Attribute Logical Only
		UserObject	
T_UserPreferences		UserPreferencesId	
		HomePageURL	
		DefaultProject	
		Preferences	
T_UserSession		UserSessionId	
		TimeCreated	
		CurrentTask	
		CurrentProcess	
		Owner	
		UserSession	
		UserObject	

5.6.3 Partitioning

Distribution of the databases will be addressed as the system scales. It will be assumed that multiple database instances will eventually exist as user transaction rates increase. Application servers will play a key role in reducing database resource usage, ultimately directing load based on user traffic to distinct database instances.

6 User Experience

A real-world prototype should ideally exist, which will be the basis for the user interface design. It is expected that UI design will be iterative due to:

- The complexity (unsophisticated nature) of the user-base
- The need for significant functionality with minimal user burden

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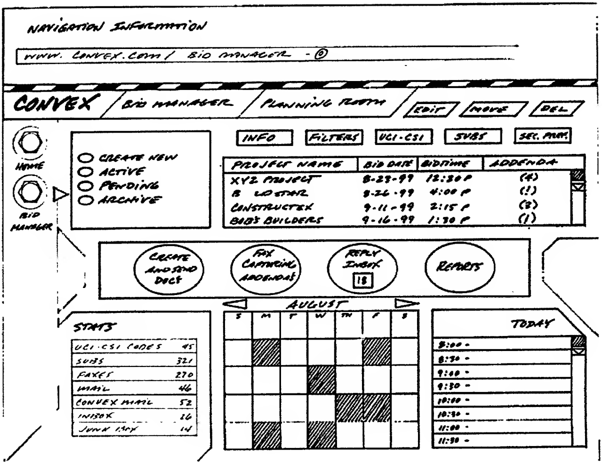
6.1 Story Boards for Bid Manager

6.1.1 Create New Bid

6.1.1.1 Screen 1

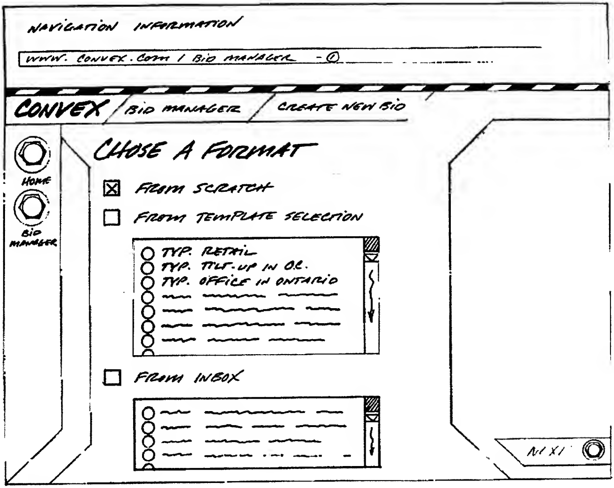


PROJECT NAME	BID DATE	BIDTIME	ADDENDA
XYZ PROJECT	8-23-99	12:30 P	(4)
B LOSTAR	8-26-99	4:00 P	(!)
CONSTRUCTEX	9-11-99	2:15 P	(3)
BOB'S BUILDERS	9-16-99	1:30 P	(1)

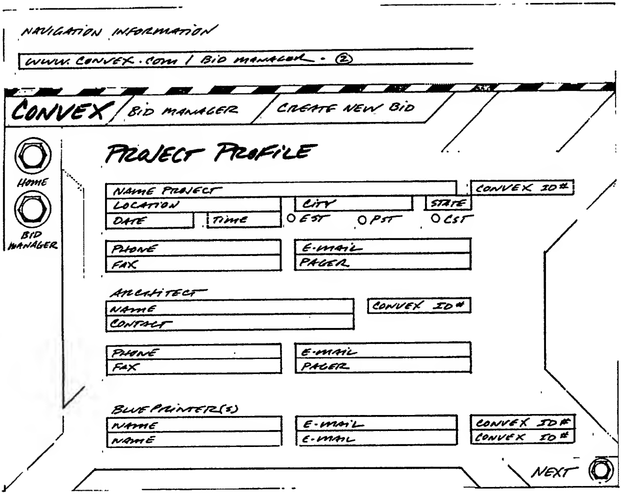
STATS

UCI-CSI CODES	45
SUBS	321
FAXES	270
MAIL	46
CONVEX MAIL	52
INBOX	26
JUNK MAIL	14

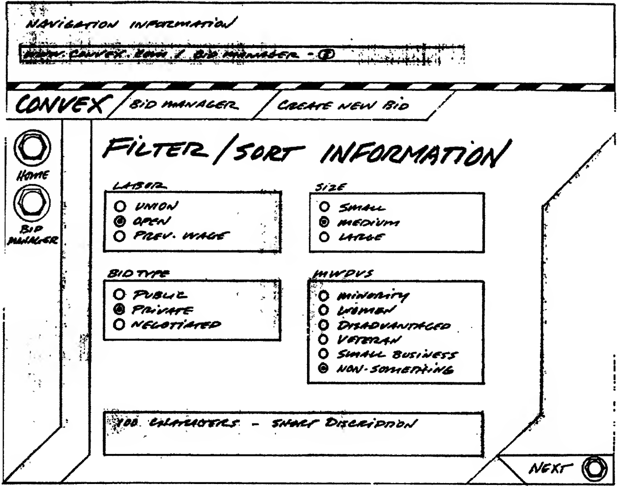
6.1.1.2 Screen 2



6.1.1.3 *Screen 3*



6.1.1.4 Screen 4



FILTER / SORT INFORMATION

LABOR
○ UNION
● OPEN
○ PREV. WAGE

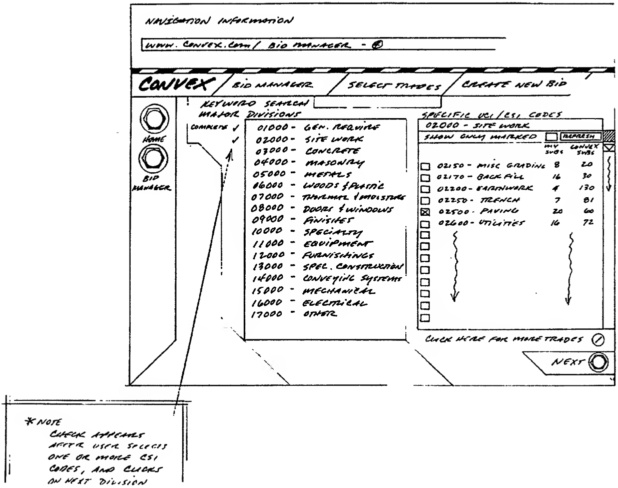
SIZE
○ SMALL
● MEDIUM
○ LARGE

BID TYPE
○ PUBLIC
● PRIVATE
○ NEGOTIATED

MWDVS
○ MINORITY
○ WOMEN
○ DISADVANTAGED
○ VETERAN
○ SMALL BUSINESS
● NON-SOMETHING

100 CHARACTERS - SHORT DISCRIPTION

6.1.1.5 Screen 5



01000 - GEN. REQUIRE
02000 - SITE WORK
03000 - CONCRETE
04000 - MASONRY
05000 - METALS
06000 - WOODS & PLASTIC
07000 - THERMAL & MOISTURE
08000 - DOORS & WINDOWS
09000 - FINISHES
10000 - SPECIALTY
11000 - EQUIPMENT
12000 - FURNISHINGS
13000 - SPEC. CONSTRUCTION
14000 - CONVEYING SYSTEMS
15000 - MECHANICAL
16000 - ELECTRICAL
17000 - OTHER

02000 - SITE WORK

		MY SUBS	CONVEX SUBS
☐	02150 - MISC GRADING	8	20
☐	02170 - BACK FILL	16	30
☐	02200 - EARTHWORK	4	130
☐	02250 - TRENCH	7	81
☒	02500 - PAVING	20	60
☐	02600 - UTILITIES	16	72
☐			
☐			
☐			
☐			
☐			
☐			
☐			
☐			

*NOTE
CHECK APPEARS
AFTER USER SELECTS
ONE OR MORE CSI
CODES, AND CLICKS
ON NEXT DIVISION

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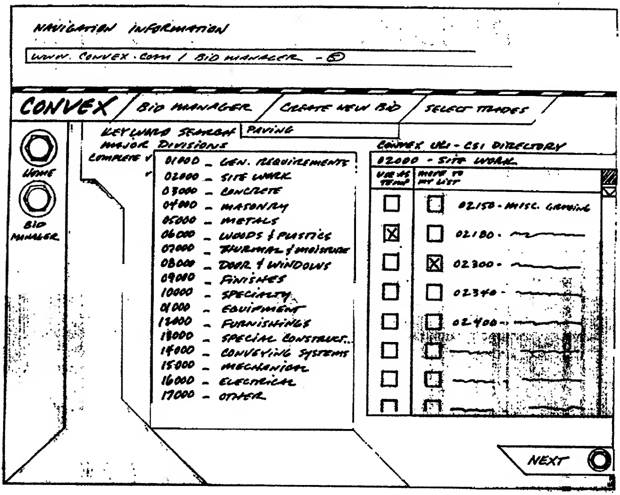
6.1.1.6 Screen 6



KEYWORD SEARCH: PAVING

01000 _ GEN. REQUIREMENTS
02000 _ SITE WORK
03000 _ CONCRETE
04000 _ MASONRY
05000 _ METALS
06000 _ WOODS & PLASTICS
07000 _ THERMAL & MOISTURE
08000 _ DOOR & WINDOWS
09000 _ FINISHES
10000 _ SPECIALTY
11000 _ EQUIPMENT
12000 _ FURNISHINGS
13000 _ SPECIAL CONSTRUCT..
14000 _ CONVEYING SYSTEMS
15000 _ MECHANICAL
16000 _ ELECTRICAL
17000 _ OTHER

02000 - SITE WORK

USE AS TEMP	MOVE TO MY LIST	
☐	☐	02150 - MISC. GRADING
☒	☐	02180 -
☐	☒	02300 -
☐	☐	02340 -
☐	☐	02400 -
☐	☐	
☐	☐	
☐	☐	

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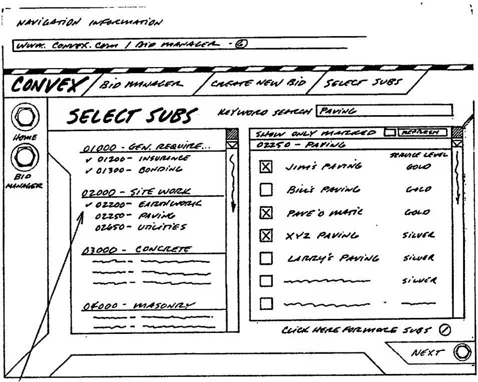
6.1.1.7 *Screen 7*



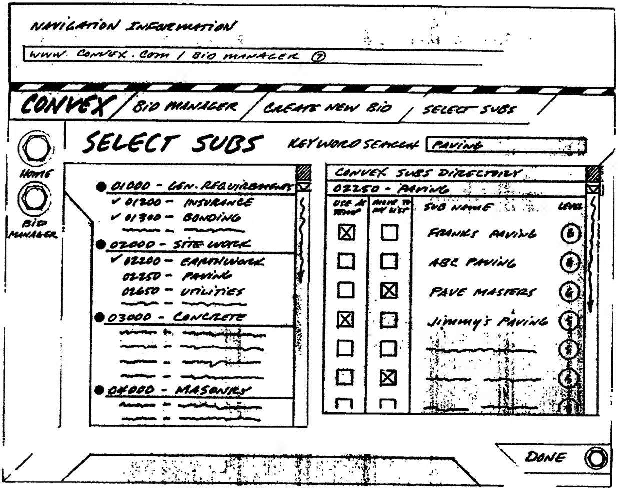
KEYWORD SEARCH: PAVING

02250 - PAVING

		SERVICE LEVEL
☒	JIM'S PAVING	GOLD
☐	BILL'S PAVING	GOLD
☒	PAVE'O MATIC	GOLD
☒	XYZ PAVING	SILVER
☐	LARRY'S PAVING	SILVER
☐		SILVER
☐		

* NOTE –
CHECK APPEARS
AFTER USER SELECTS
ONE OR MORE SUBS
AND CLICKS ON
NEXT DIVISION

6.1.1.8 Screen 8



KEYWORD SEARCH: PAVING

- ● 01000 - GEN. REQUIREMENTS
  - ✓ 01200 - INSURANCE
  - ✓ 01300 - BONDING
- ● 02000 - SITE WORK
  - ✓ 02200 - EARTHWORK
  - 02250 - PAVING
  - 02650 - UTILITIES
- ● 03000 - CONCRETE
- ● 04000 - MASONRY

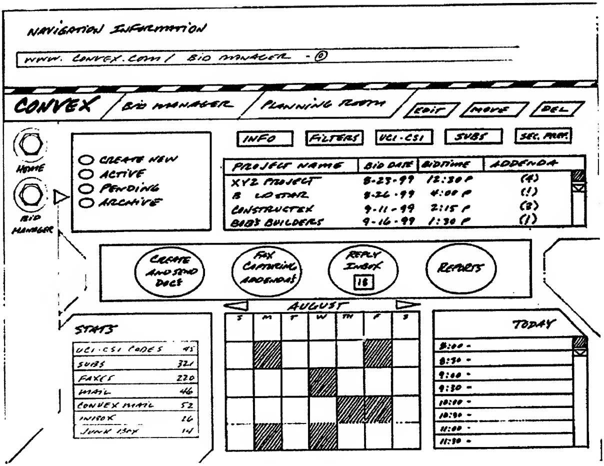
CONVEX SUBS DIRECTORY

02250 - PAVING

[illegible]	MOVE TO MY LIST	SUB NAME	LEVEL
☒	☐	FRANKS PAVING	6
☐	☐	ABC PAVING	[illegible]
☐	☒	PAVE MASTERS	6
☒	☐	JIMMY'S PAVING	5
☐	☐		
☐	☒		

6.1.2 Invitation to Bid

6.1.2.1 Screen 1

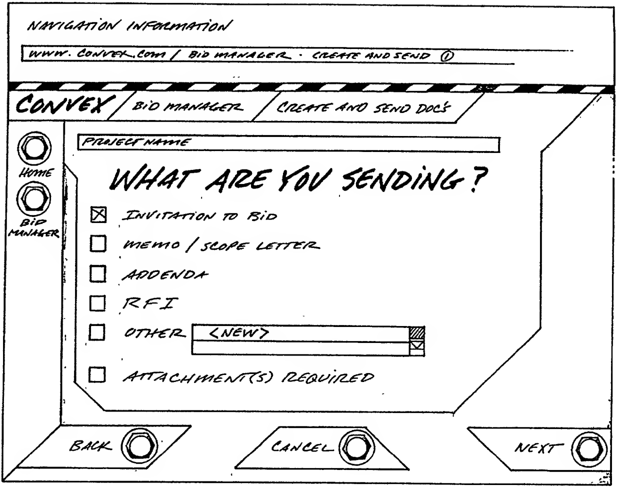


PROJECT NAME	BID DATE	BIDTIME	ADDENDA
XYZ PROJECT	8-23-99	12:30 P	(4)
B LOSTAR	8-26-99	4:00 P	(1)
CONSTRUCTEX	9-11-99	2:15 P	(3)
BOB'S BUILDERS	9-16-99	1:30 P	(1)

STATS

UCI-CSI CODES	45
SUBS	321
FAXES	220
MAIL	46
CONVEX MAIL	52
INBOX	26
JUNK BOX	14

6.1.2.2 Screen 2



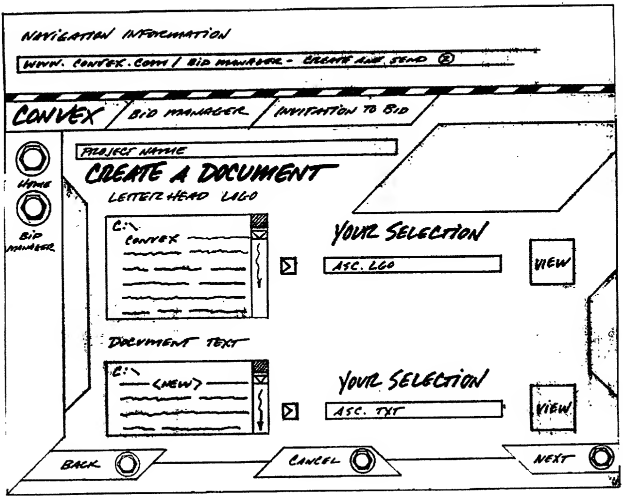
PROJECT NAME

WHAT ARE YOU SENDING?

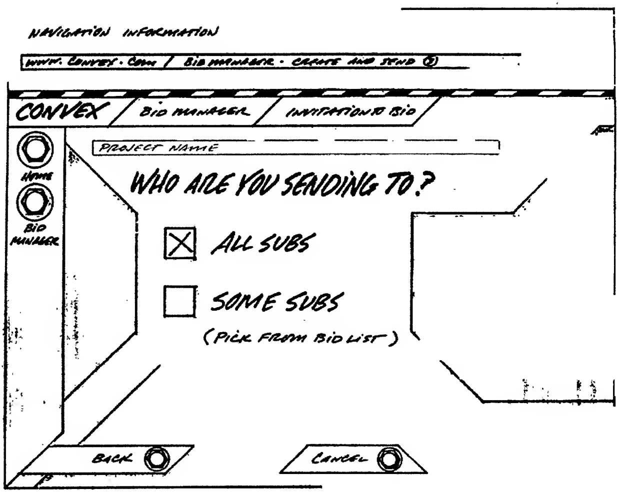
☒ INVITATION TO BID
☐ MEMO / SCOPE LETTER
☐ ADDENDA
☐ RFI
☐ OTHER <NEW>
☐ ATTACHMENT(S) REQUIRED

PRINT OF DRAWINGS
AS ORIGINALLY FILED

6.1.2.3 Screen 3



6.1.2.4 Screen 4

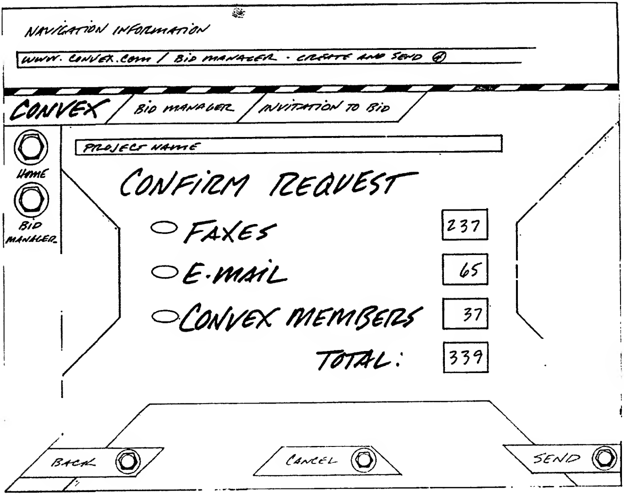


WHO ARE YOU SENDING TO?

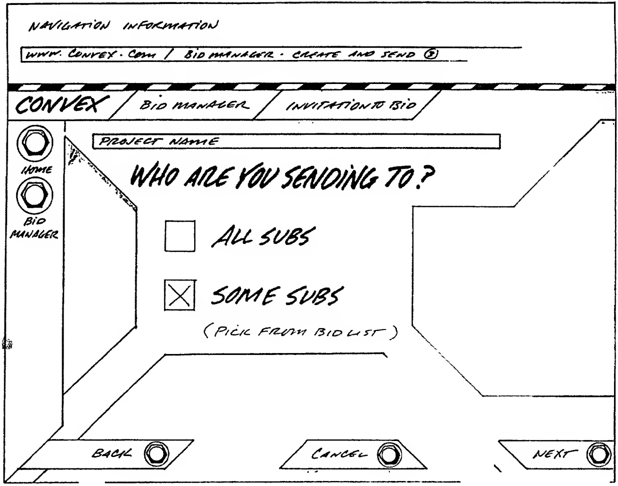
☒ ALL SUBS

☐ SOME SUBS
(PICK FROM BID LIST)

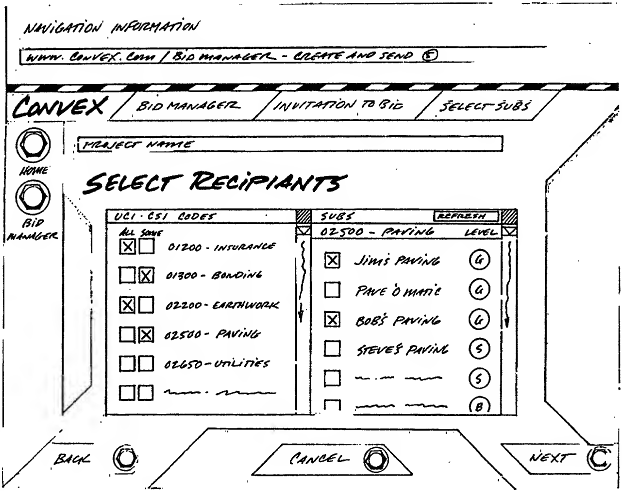
6.1.2.5 Screen 5



6.1.2.6 Screen 6



6.1.2.7 *Screen 7*



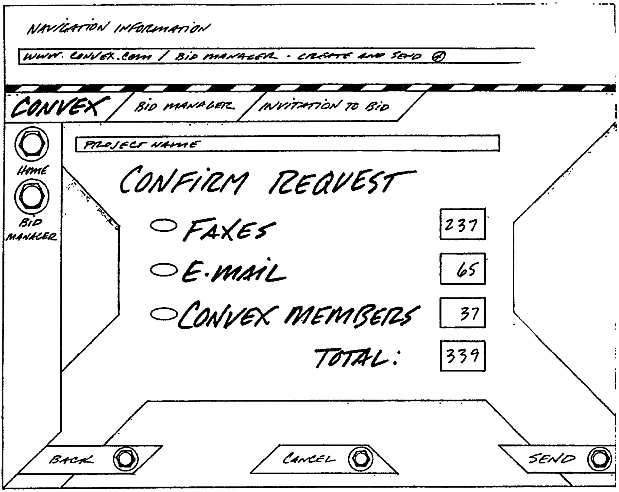
WWW. CONVEX. COM / BID MANAGER - CREATE AND SEND Ⓔ

ALL	SOME	
☒	☐	01200 - INSURANCE
☐	☒	01300 - BONDING
☒	☐	02200 - EARTHWORK
☐	☒	02500 - PAVING
☐	☐	02650 - UTILITIES

02500 - PAVING

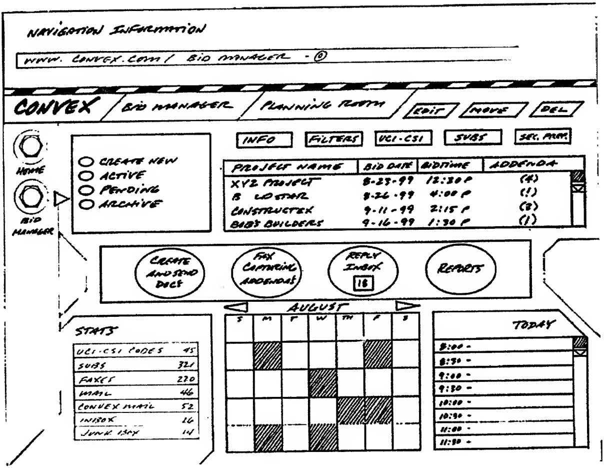
		LEVEL
☒	JIM'S PAVING	Ⓖ
☐	PAVE O MATIC	Ⓖ
☒	BOB'S PAVING	Ⓖ
☐	STEVE'S PAVING	Ⓢ
☐		Ⓢ
☐		Ⓑ

6.1.2.8 Screen 8



6.1.3 Create and Send Documents

6.1.3.1 Screen 1

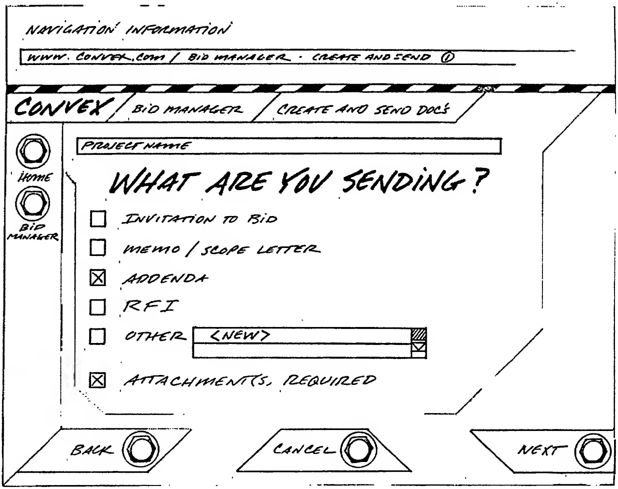


PROJECT NAME	BID DATE	BIDTIME	ADDENDA
XYZ PROJECT	8-23-99	12:30 P	(4)
B LOSTAR	8-26-99	4:00 P	(1)
CONSTRUCTEX	9-11-99	2:15 P	(3)
BOB'S BUILDERS	9-16-99	1:30 P	(1)

STATS

UCI-CSI CODES	45
SUBS	321
FAXES	220
MAIL	46
CONVEX MAIL	52
INBOX	26
JUNK BOX	14

6.1.3.2 Screen 2



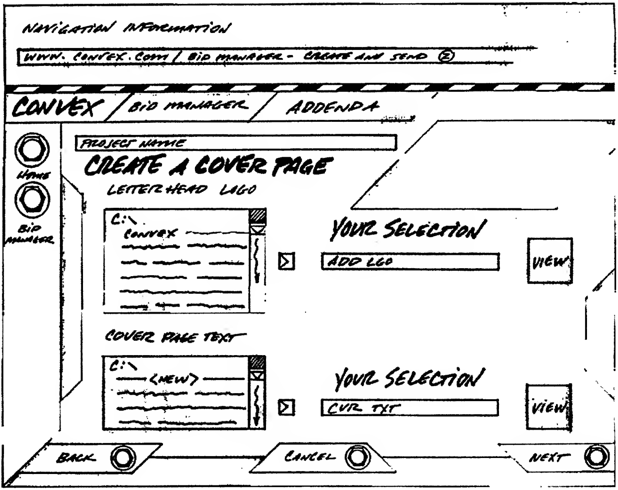
PROJECT NAME

WHAT ARE YOU SENDING?

☐ INVITATION TO BID
☐ MEMO / SCOPE LETTER
☒ ADDENDA
☐ RFI
☐ OTHER <NEW>

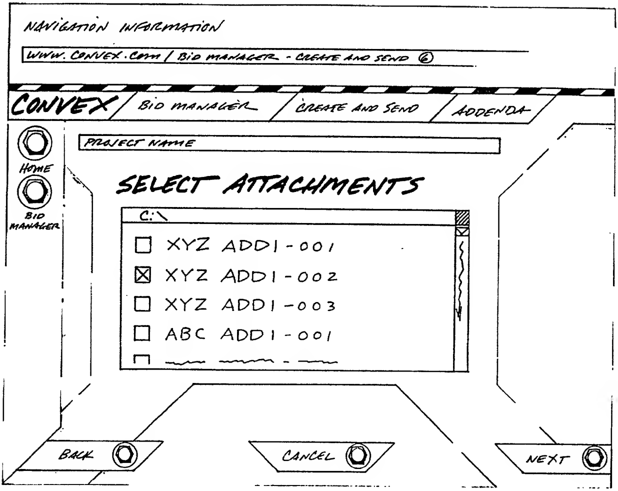
☒ ATTACHMENT(S) REQUIRED

6.1.3.3 *Screen 3*



PRINT OF DRAWINGS
AS ORIGINALLY FILED

6.1.3.4 Screen 4



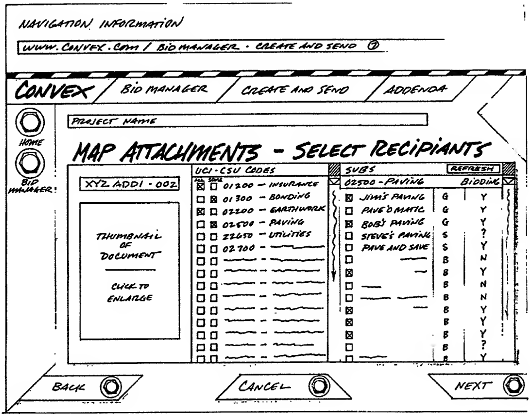
WWW.CONVEX.COM / BID MANAGER - CREATE AND SEND ⑥

PROJECT NAME

C:\

☐ XYZ ADD1-001
☒ XYZ ADD1-002
☐ XYZ ADD1-003
☐ ABC ADD1-001

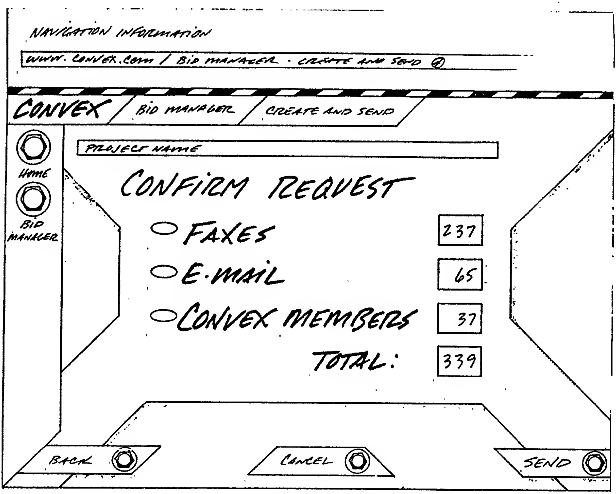
6.1.3.5 Screen 5



✱ NOTE –
NEED ALGORYTHEM TO PUBLISH WORD DOC'S, EXCEL DOC'S, ETC, AS ATTACHABLES. IF SUB HAS FAX AND E-MAIL PROFILE WE NEED TO CONVERT .DOC, .XLS, ETC, TO FAX DOCUMENTS.

✱ NOTE –
HOW CAN AN ARCHITECT SEND .DOC TO ME AND I PUSH IT OUT VIA FAX - E-MAIL DATA?

6.1.3.6 Screen 6

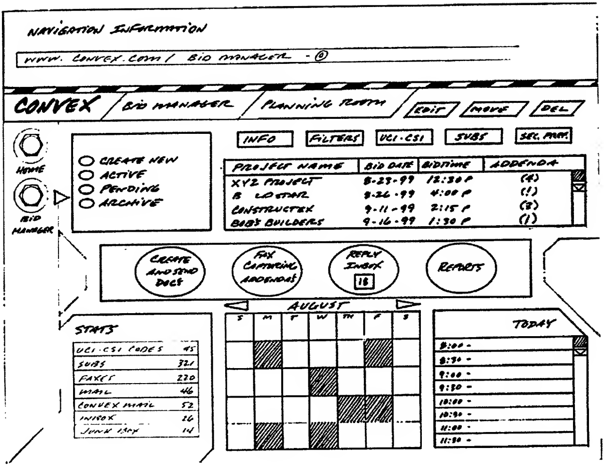


CONFIRM REQUEST

○ FAXES	237
○ E-MAIL	65
○ CONVEX MEMBERS	37
TOTAL:	339

6.1.4 Fax Capture

6.1.4.1 Screen 1



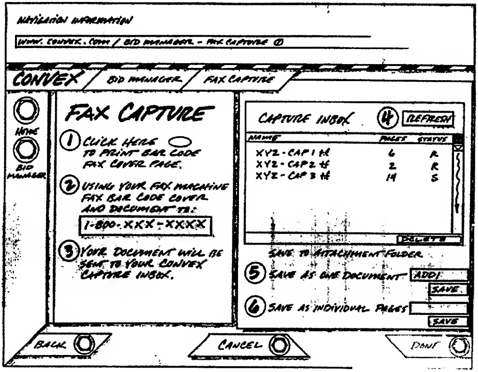
○ CREATE NEW
○ ACTIVE
○ PENDING
○ ARCHIVE

PROJECT NAME	BID DATE	BIDTIME	ADDENDA
XYZ PROJECT	8-23-99	12:30 P	(4)
B LO STAR	8-26-99	4:00 P	(1)
CONSTRUCTEX	9-11-99	2:15 P	(3)
BOB'S BUILDERS	9-16-99	1:30 P	(1)

STATS

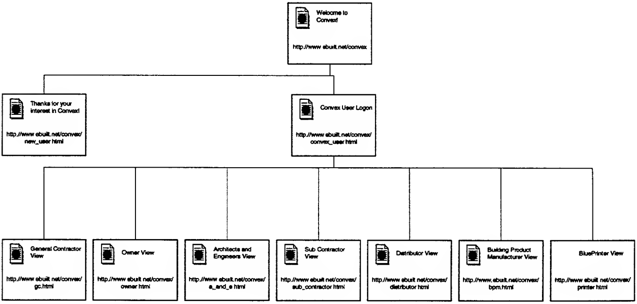
UCI-CSI CODES	45
SUBS	321
FAXES	220
MAIL	46
CONVEX MAIL	52
INBOX	26
JUNK BOX	14

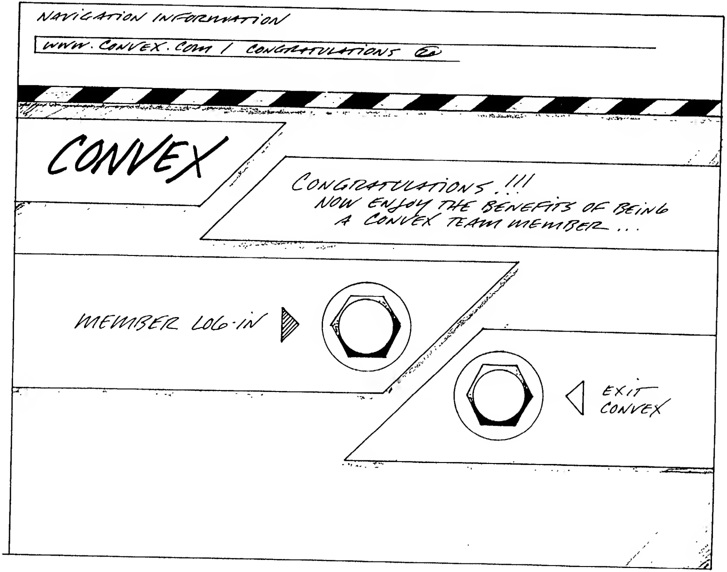
6.1.4.2 Screen 2



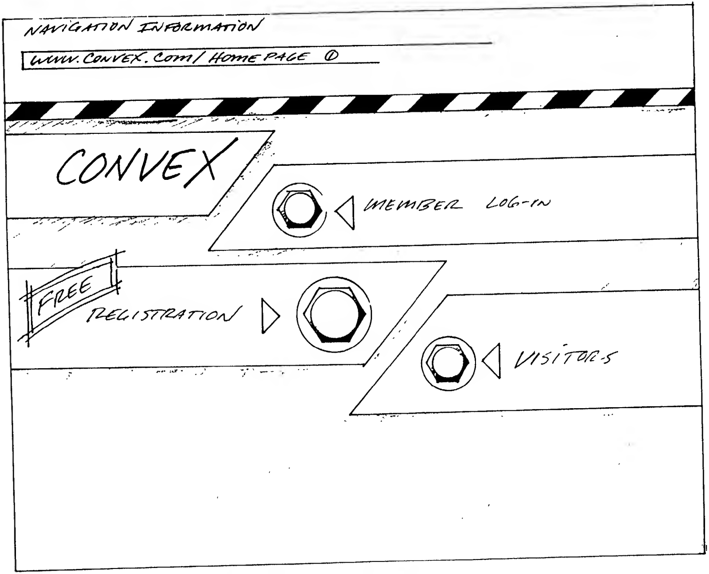
* NOTE -
PAGE EXTENSION
XXXX - 001
↓
NNN
TO END OF STRING !!

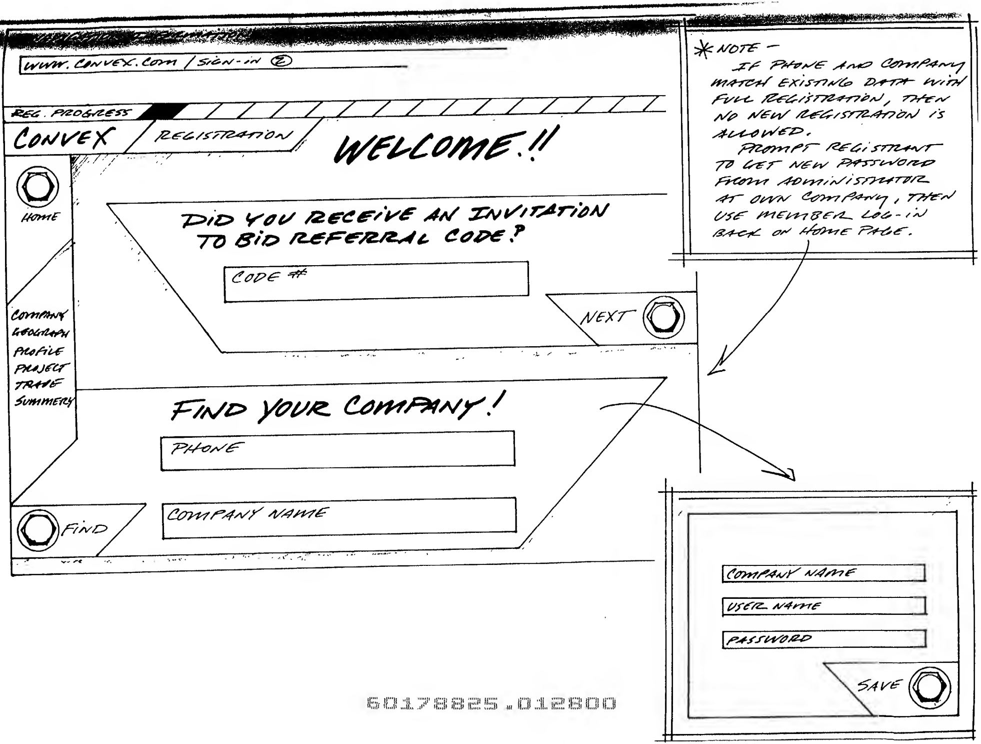
6.2 Site Map





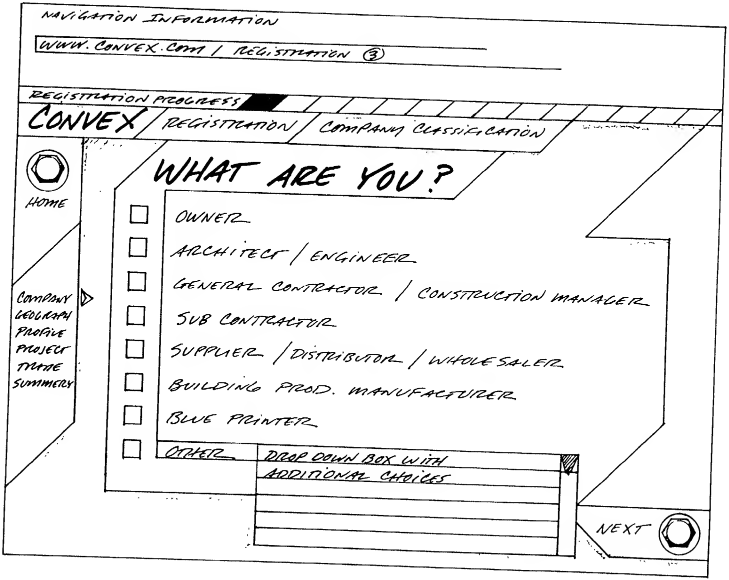
CONGRATULATIONS.!!!
NOW ENJOY THE BENEFITS OF BEING
A CONVEX TEAM MEMBER...

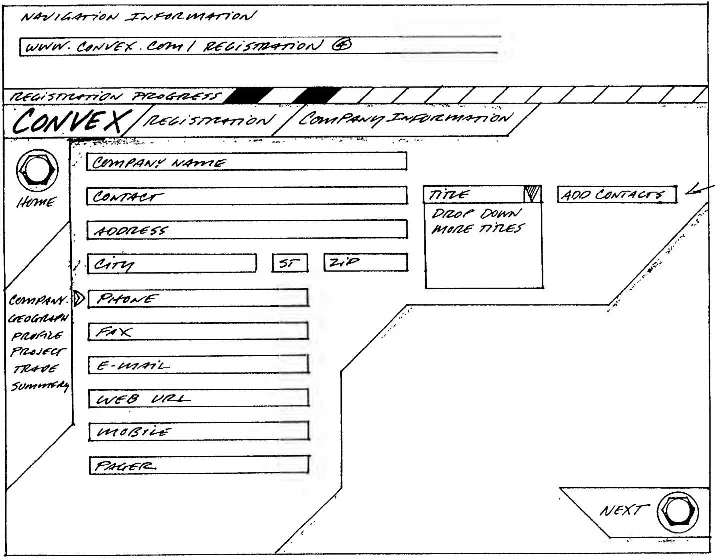

NAVIGATION INFORMATION
www.CONVEX.Com/ HOME PAGE ①
CONVEX
MEMBER LOG-IN
FREE
REGISTRATION
VISITORS



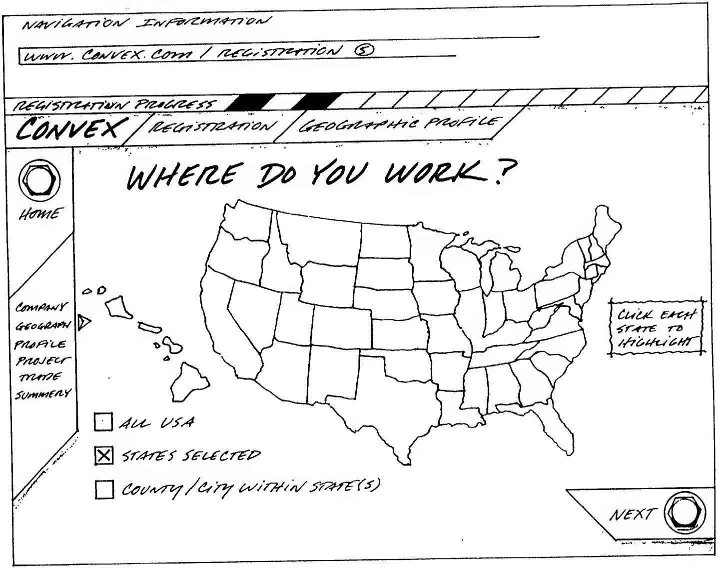
* NOTE –
IF PHONE AND COMPANY MATCH EXISTING DATA WITH FULL REGISTRATION, THEN NO NEW REGISTRATION IS ALLOWED.

PROMPT REGISTRANT TO GET NEW PASSWORD FROM ADMINISTRATOR AT OWN COMPANY, THEN USE MEMBER LOG-IN BACK ON HOME PAGE.

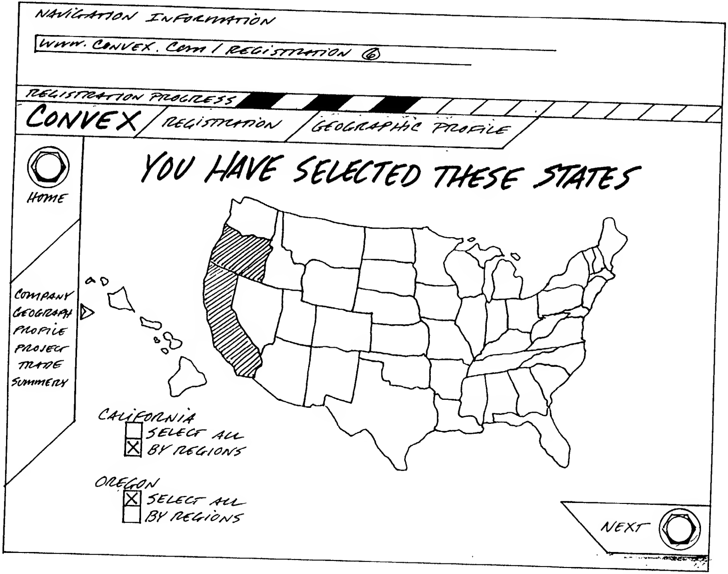

NAVIGATION INFORMATION
WWW. CONVEX.COM / REGISTRATION ③
REGISTRATION PROGRESS
CONVEX
REGISTRATION
COMPANY CLASSIFICATION
HOME
COMPANY
GEOGRAPHY
PROFILE
PROJECT
TRADE
SUMMERY
WHAT ARE YOU?
OWNER
ARCHITECT / ENGINEER
GENERAL CONTRACTOR / CONSTRUCTION MANAGER
SUB CONTRACTOR
SUPPLIER / DISTRIBUTOR / WHOLESALER
BUILDING PROD. MANUFACTURER
BLUE PRINTER
OTHER
DROP DOWN BOX WITH ADDITIONAL CHOICES
NEXT



* NOTE –
PROMPT USER
TO ADD CONTACT
NAMES LATER.



☐ ALL USA
☒ STATES SELECTED
☐ COUNTY / CITY WITHIN STATE(S)

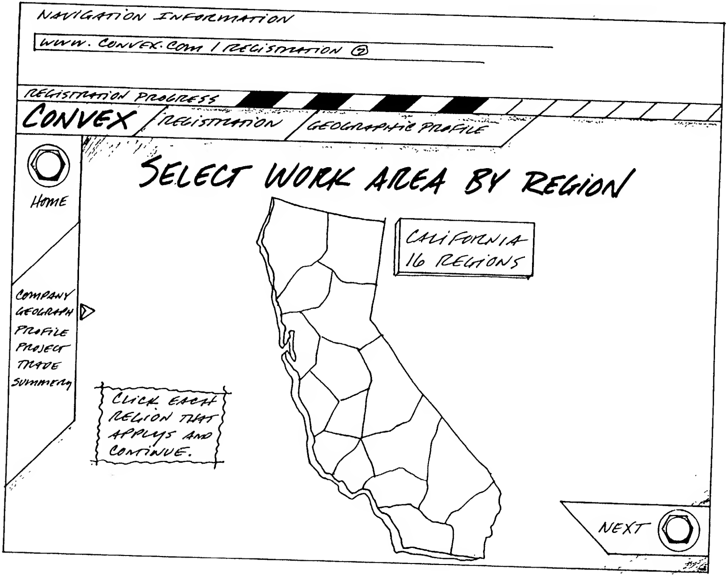


WWW. CONVEX. COM / REGISTRATION ⑥

YOU HAVE SELECTED THESE STATES

CALIFORNIA
☐ SELECT ALL
☒ BY REGIONS

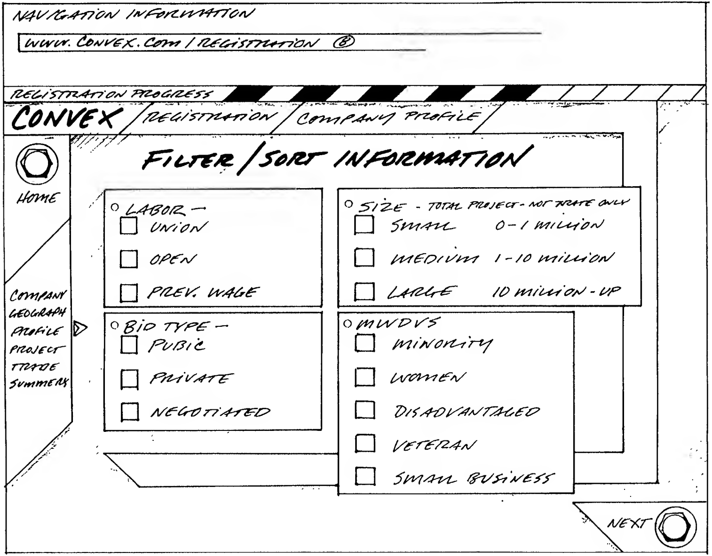
OREGON
☒ SELECT ALL
☐ BY REGIONS

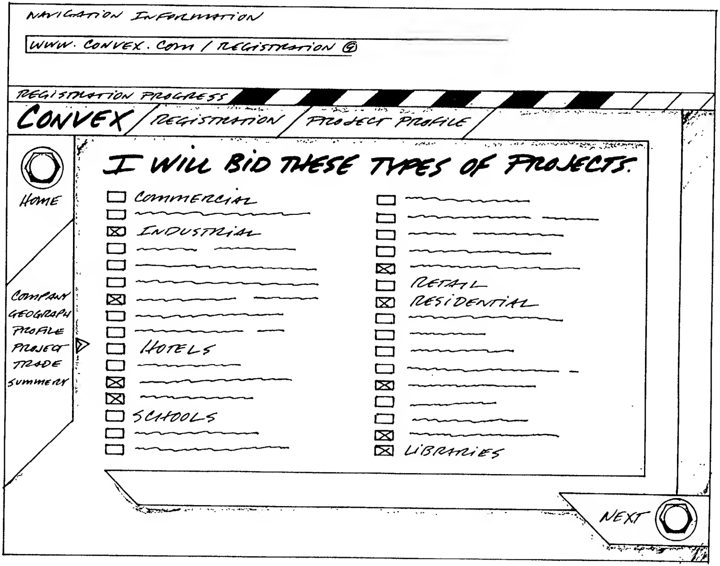


SELECT WORK AREA BY REGION

CALIFORNIA
16 REGIONS

CLICK EACH REGION THAT APPLYS AND CONTINUE.

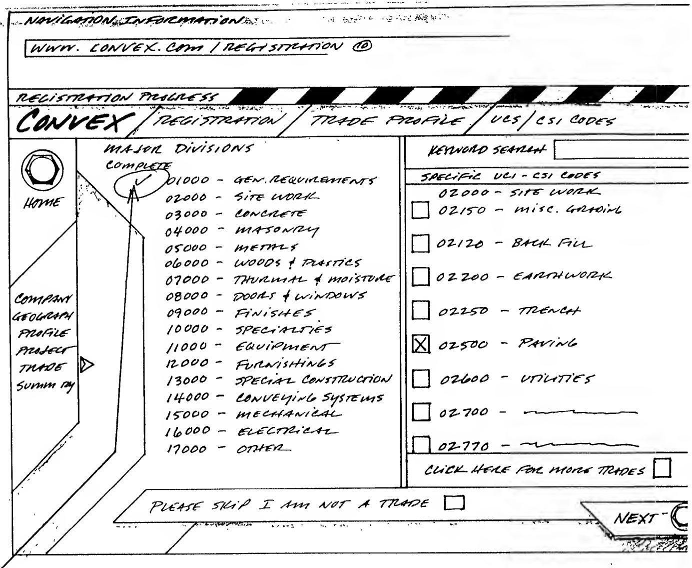

NAVIGATION INFORMATION
WWW. CONVEX. COM / REGISTRATION ®
REGISTRATION PROGRESS
CONVEX
REGISTRATION
COMPANY PROFILE
HOME
COMPANY
GEOGRAPH
PROFILE
PROJECT
TRADE
SUMMERY
FILTER / SORT INFORMATION
○ LABOR –
☐ UNION
☐ OPEN
☐ PREV. WAGE
○ BID TYPE –
☐ PUBIC
☐ PRIVATE
☐ NEGOTIATED
○ SIZE - TOTAL PROJECT - NOT TRADE ONLY
☐ SMALL 0-1 MILLION
☐ MEDIUM 1-10 MILLION
☐ LARGE 10 MILLION - UP
○ MWDVS
☐ MINORITY
☐ WOMEN
☐ DISADVANTAGED
☐ VETERAN
☐ SMALL BUSINESS
NEXT



I WILL BID THESE TYPES OF PROJECTS.

☐ COMMERCIAL
☒ INDUSTRIAL
☐ HOTELS
☐ SCHOOLS
☐ RETAIL
☒ RESIDENTIAL
☒ LIBRARIES

KEYWORD SEARCH
MUST BE MORE
NOTICEABLE!



NAVIGATION INFORMATION

WWW. CONVEX.COM / REGISTRATION ⑩

REGISTRATION PROGRESS

CONVEX / REGISTRATION / TRADE PROFILE / UCS / CSI CODES

HOME

COMPANY
GEOGRAPH
PROFILE
PROJECT
TRADE
SUMMARY

MAJOR DIVISIONS
COMPLETE ✓

01000 - GEN. REQUIREMENTS
02000 - SITE WORK
03000 - CONCRETE
04000 - MASONRY
05000 - METALS
06000 - WOODS & PLASTICS
07000 - THURMAL & MOISTURE
08000 - DOORS & WINDOWS
09000 - FINISHES
10000 - SPECIALTIES
11000 - EQUIPMENT
12000 - FURNISHINGS
13000 - SPECIAL CONSTRUCTION
14000 - CONVEYING SYSTEMS
15000 - MECHANICAL
16000 - ELECTRICAL
17000 - OTHER

KEYWORD SEARCH

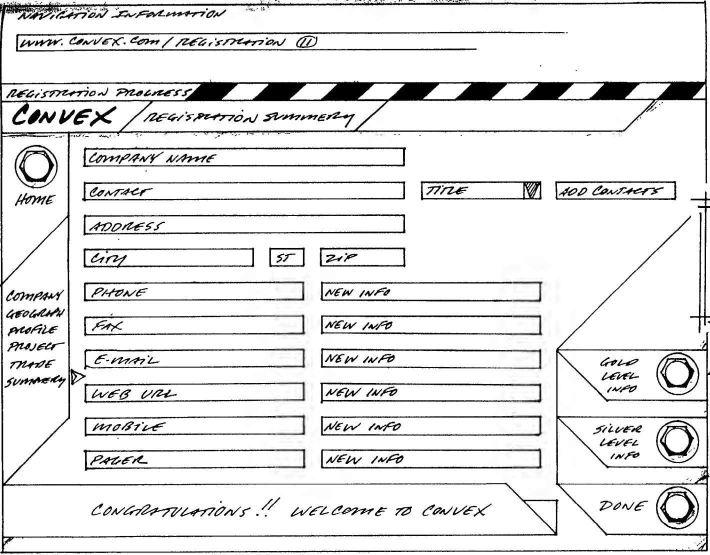
SPECIFIC UCI - CSI CODES
02000 - SITE WORK
☐ 02150 - MISC. GRADING
☐ 02120 - BACK FILL
☐ 02200 - EARTHWORK
☐ 02250 - TRENCH
☒ 02500 - PAVING
☐ 02600 - UTILITIES
☐ 02700 -
☐ 02770 -

CLICK HERE FOR MORE TRADES ☐

PLEASE SKIP I AM NOT A TRADE ☐

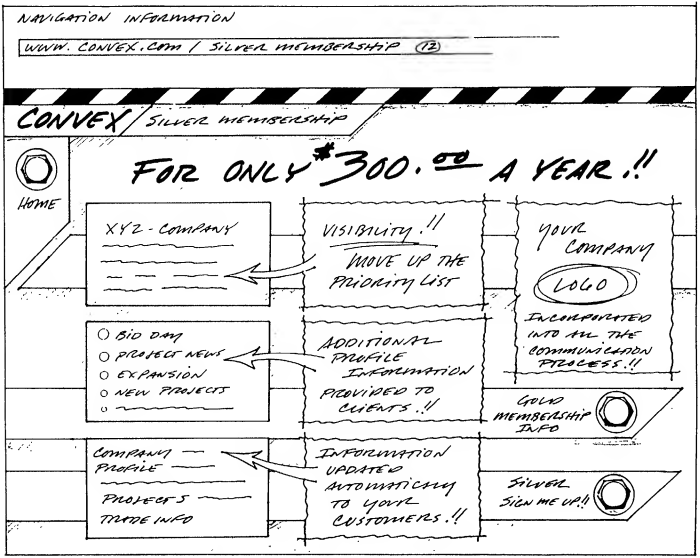
NEXT

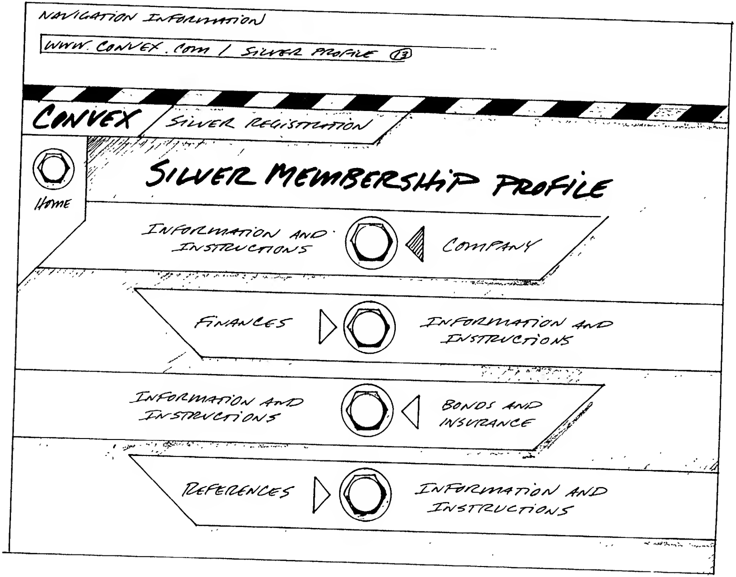
* NOTE -
CHECK APPEARS AFTER USER SELECTS ONE OR MORE UCI - CSI CODES, AND CLICKS ON NEXT DIVISION.

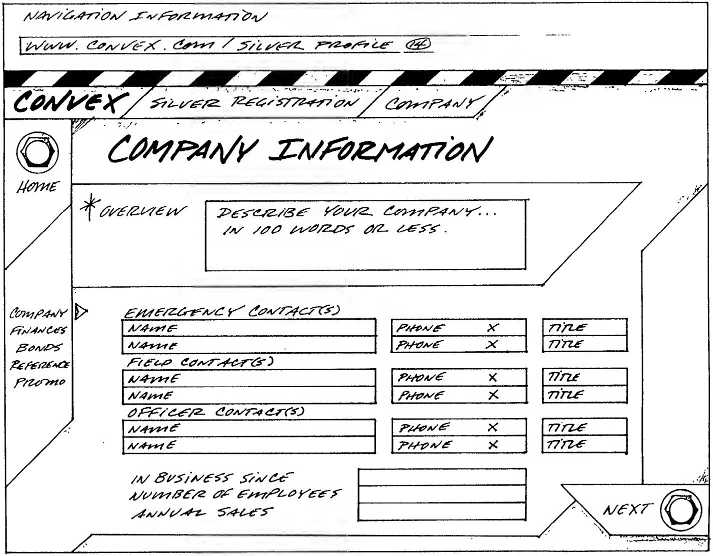


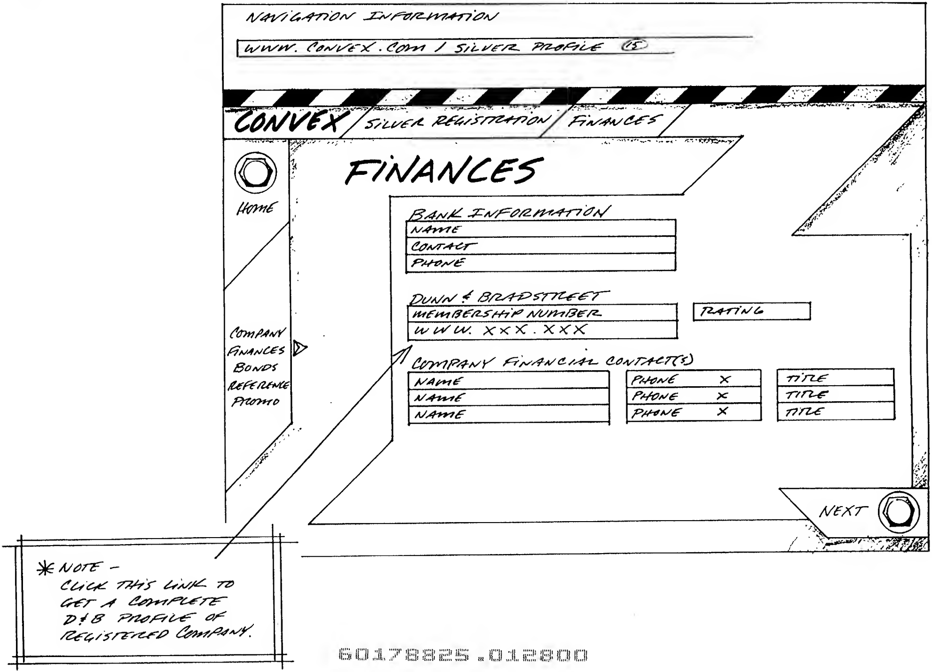
* NOTE
CLICKING HERE WILL
TAKE YOU TO GOLD
LEVEL PROMOTIONAL
PAGE TO REGISTER

* NOTE
CLICKING HERE WILL
TAKE YOU TO SILVER
LEVEL PROMOTIONAL
PAGE TO REGISTER.

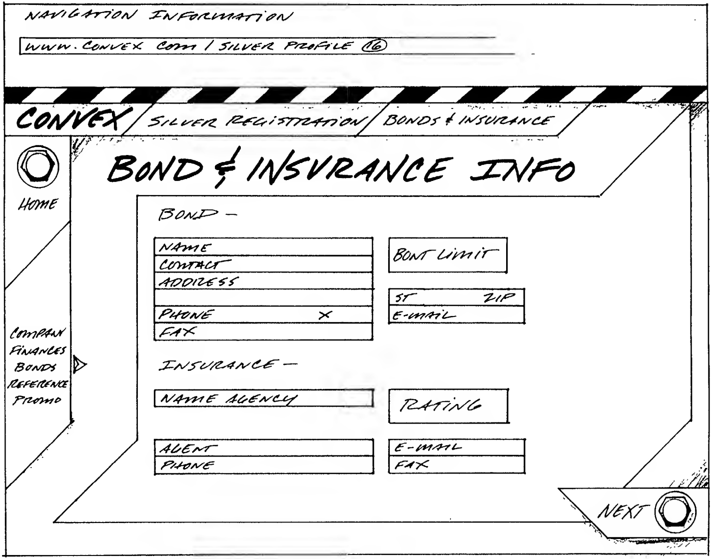

NAVIGATION INFORMATION
WWW. CONVEX.COM / SILVER MEMBERSHIP
12
CONVEX
SILVER MEMBERSHIP
HOME
FOR ONLY $300.00 A YEAR.!!
XYZ - COMPANY
VISIBILITY.!!
MOVE UP THE PRIORITY LIST
YOUR COMPANY
LOGO
INCORPORATED INTO ALL THE COMMUNICATION PROCESS.!!
○ BID DAY
○ PROJECT NEWS
○ EXPANSION
○ NEW PROJECTS
○
ADDITIONAL PROFILE INFORMATION PROVIDED TO CLIENTS.!!
GOLD MEMBERSHIP INFO
COMPANY PROFILE
PROJECTS
TRADE INFO
INFORMATION UPDATED AUTOMATICALLY TO YOUR CUSTOMERS.!!
SILVER SIGN ME UP.!!

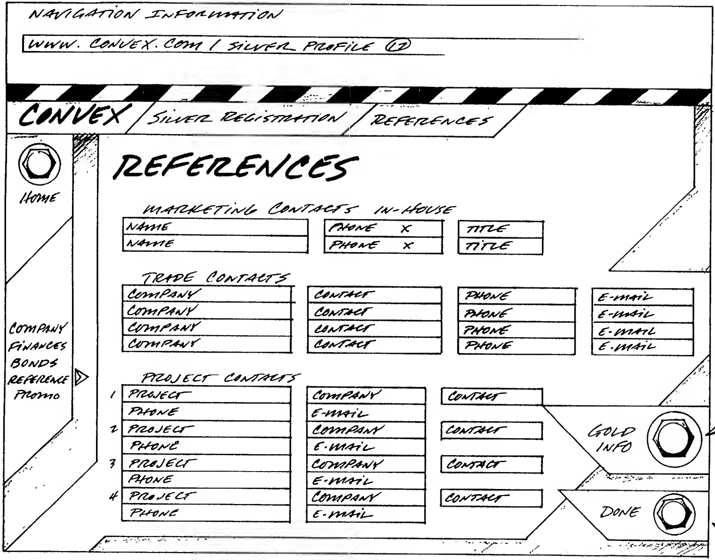

NAVIGATION INFORMATION
WWW.CONVEX.COM / SILVER PROFILE
13
CONVEX
SILVER REGISTRATION
HOME
SILVER MEMBERSHIP PROFILE
INFORMATION AND INSTRUCTIONS
COMPANY
FINANCES
INFORMATION AND INSTRUCTIONS
INFORMATION AND INSTRUCTIONS
BONDS AND INSURANCE
REFERENCES
INFORMATION AND INSTRUCTIONS


NAVIGATION INFORMATION
WWW. CONVEX. COM / SILVER PROFILE ⑭
CONVEX
SILVER REGISTRATION
COMPANY
HOME
COMPANY INFORMATION
* OVERVIEW
DESCRIBE YOUR COMPANY... IN 100 WORDS OR LESS.
COMPANY
FINANCES
BONDS
REFERENCE
PROMO
EMERGENCY CONTACT(S)
NAME
NAME
PHONE X
PHONE X
TITLE
TITLE
FIELD CONTACT(S)
NAME
NAME
PHONE X
PHONE X
TITLE
TITLE
OFFICER CONTACT(S)
NAME
NAME
PHONE X
PHONE X
TITLE
TITLE
IN BUSINESS SINCE
NUMBER OF EMPLOYEES
ANNUAL SALES
NEXT



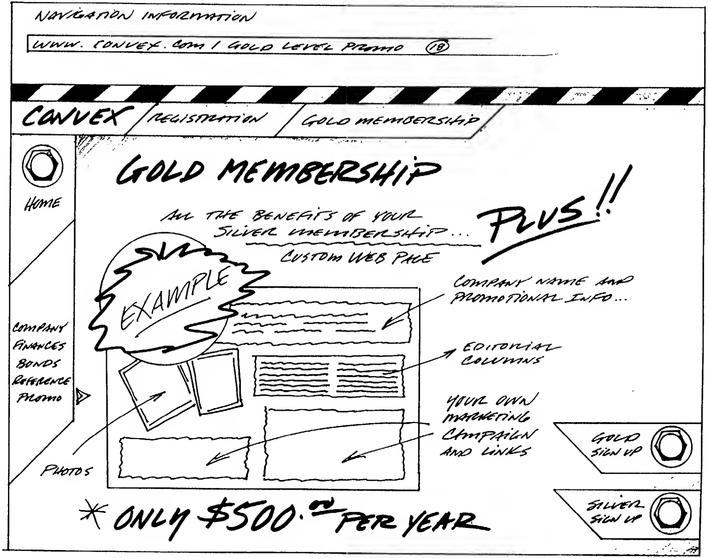
✱ NOTE –
CLICK THIS LINK TO
GET A COMPLETE
D&B PROFILE OF
REGISTERED COMPANY.

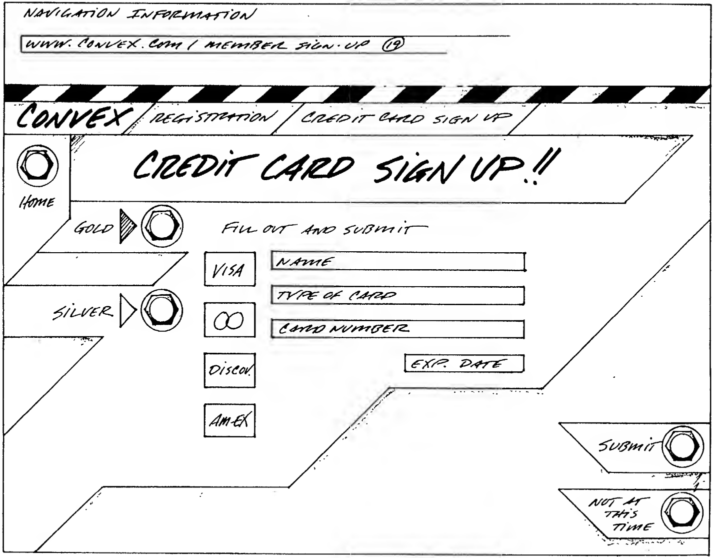

NAVIGATION INFORMATION
WWW.CONVEX COM / SILVER PROFILE ⑯
CONVEX
SILVER REGISTRATION
BONDS & INSURANCE
HOME
BOND & INSURANCE INFO
BOND –
NAME
CONTACT
ADDRESS
PHONE
X
FAX
BONT LIMIT
ST
ZIP
E-MAIL
COMPANY
FINANCES
BONDS
REFERENCE
PROMO
INSURANCE –
NAME AGENCY
RATING
AGENT
PHONE
E-MAIL
FAX
NEXT



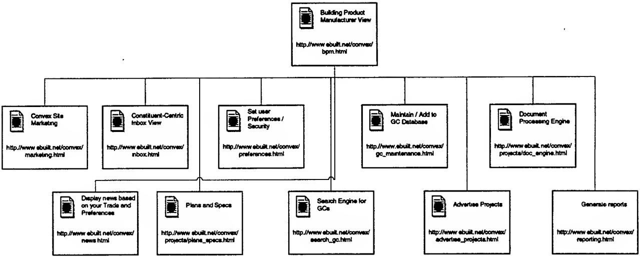
*NOTE –
CLICK LINK TO GO
TO GOLD MEMBER
PROFILE.

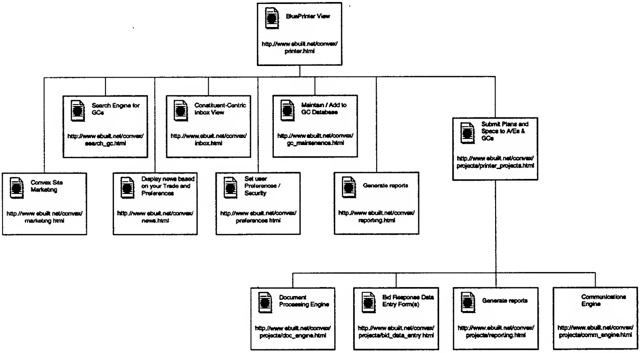
*NOTE –
SENDS REGISTRANT
TO CREDIT CARD
SIGN IN.

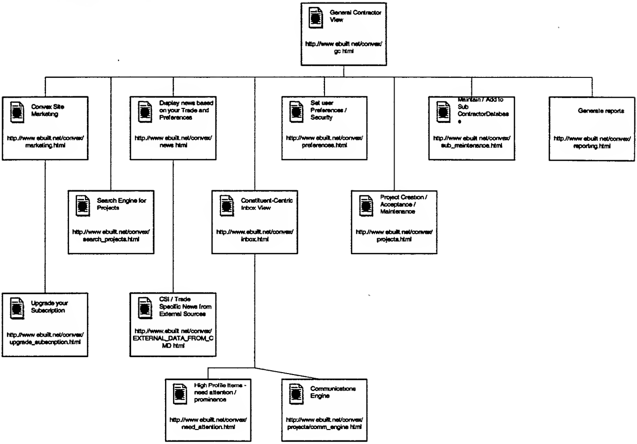

NAVIGATION INFORMATION
WWW. CONVEX. COM / GOLD LEVEL PROMO
(18)
CONVEX
REGISTRATION
GOLD MEMBERSHIP
HOME
COMPANY
FINANCES
BONDS
REFERENCE
PROMO
GOLD MEMBERSHIP
ALL THE BENEFITS OF YOUR SILVER MEMBERSHIP...
PLUS!!
CUSTOM WEB PAGE
EXAMPLE
COMPANY NAME AND PROMOTIONAL INFO...
EDITORIAL COLUMNS
YOUR OWN MARKETING CAMPAIGN AND LINKS
PHOTOS
GOLD SIGN UP
SILVER SIGN UP
* ONLY $500.00 PER YEAR


NAVIGATION INFORMATION
WWW. CONVEX. COM / MEMBER SIGN-UP
⑲
CONVEX
REGISTRATION
CREDIT CARD SIGN UP
HOME
CREDIT CARD SIGN UP!!
GOLD
SILVER
FILL OUT AND SUBMIT
VISA
DISCOV.
AM-EX
NAME
TYPE OF CARD
CARD NUMBER
EXP. DATE
SUBMIT
NOT AT THIS TIME

PRINT OF DRAWINGS
AS ORIGINALLY FILED






General Contractor View
http://www.ebuilt.net/convex/gc.html
Convex Site Marketing
http://www.ebuilt.net/convex/marketing.html
Display news based on your Trade and Preferences
http://www.ebuilt.net/convex/news.html
Set user Preferences / Security
http://www.ebuilt.net/convex/preferences.html
Maintain / Add to Sub ContractorDatabase
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Generate reports
http://www.ebuilt.net/convex/reporting.html
Search Engine for Projects
http://www.ebuilt.net/convex/search_projects.html
Constituent-Centric Inbox View
http://www.ebuilt.net/convex/inbox.html
Project Creation / Acceptance / Maintenance
http://www.ebuilt.net/convex/projects.html
Upgrade your Subscription
http://www.ebuilt.net/convex/upgrade_subscription.html
CSI / Trade Specific News from External Sources
http://www.ebuilt.net/convex/EXTERNAL_DATA_FROM_CMD.html
High Profile Items - need attention / prominence
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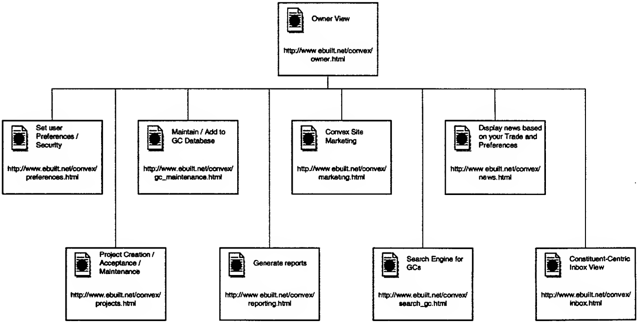
Communications Engine
http://www.ebuilt.net/convex/projects/comm_engine.html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http://www.ebuilt.net/convex/marketing.html
Display news based on your Trade and Preferences
http://www.ebuilt.net/convex/news.html
Project Creation / Acceptance / Maintenance
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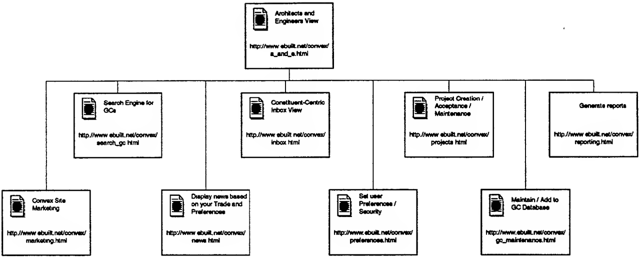
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Search Engine for GCs
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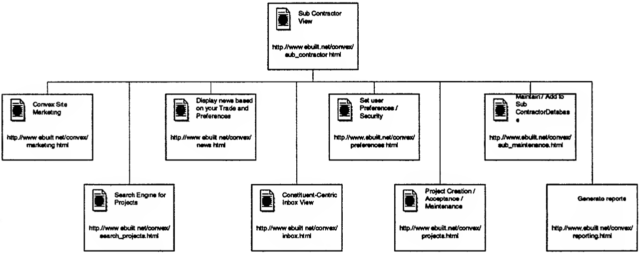
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Convex Site Marketing
http://www.ebuilt.net/convex/marketing.html
Display news based on your Trade and Preferences
http://www.ebuilt.net/convex/news.html
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Generate reports
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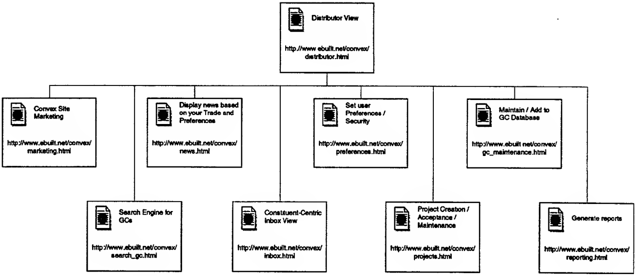

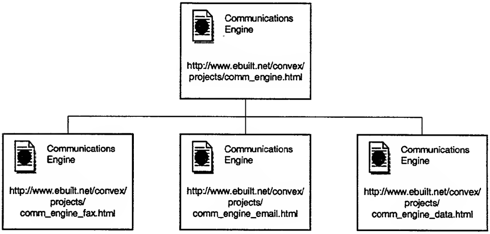

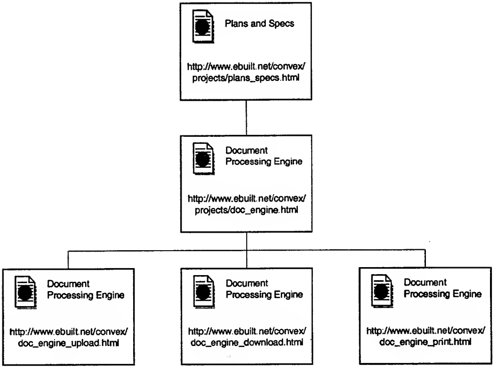
Plans and Specs
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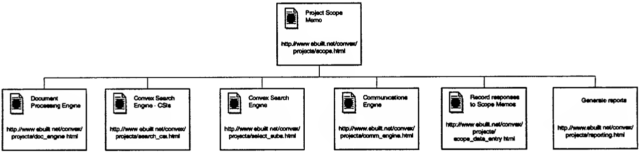
Document Processing Engine
http://www.ebuilt.net/convex/doc_engine_print.html


Project Scope Memo
http://www.ebuilt.net/convex/projects/scope.html
Document Processing Engine
http://www.ebuilt.net/convex/projects/doc_engine.html
Convex Search Engine - CSIs
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Convex Search Engine
http://www.ebuilt.net/convex/projects/select_subs.html
Communications Engine
http://www.ebuilt.net/convex/projects/comm_engine.html
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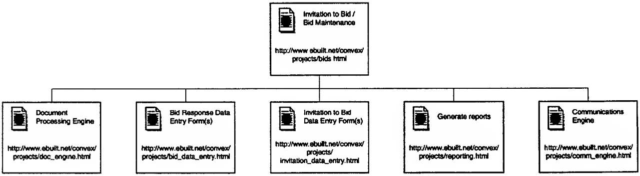
Generate reports
http://www.ebuilt.net/convex/projects/reporting.html


Invitation to Bid / Bid Maintenance
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Document Processing Engine
http://www.ebuilt.net/convex/projects/doc_engine.html
Bid Response Data Entry Form(s)
http://www.ebuilt.net/convex/projects/bid_data_entry.html
Invitation to Bid Data Entry Form(s)
http://www.ebuilt.net/convex/projects/invitation_data_entry.html
Generate reports
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Communications Engine
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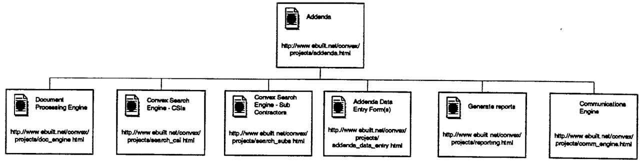

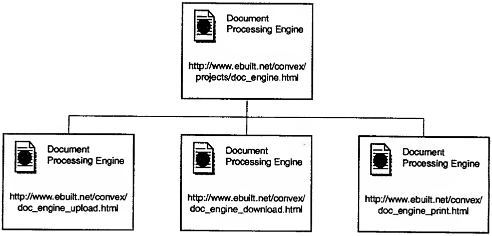

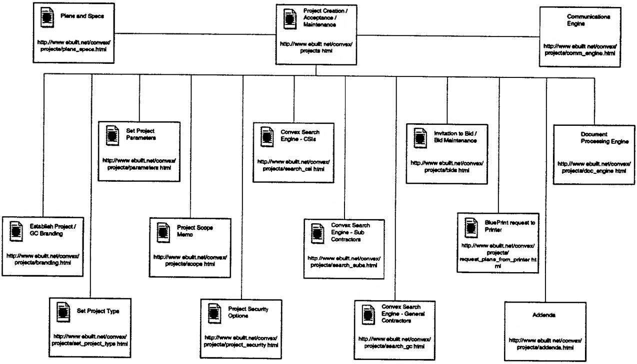

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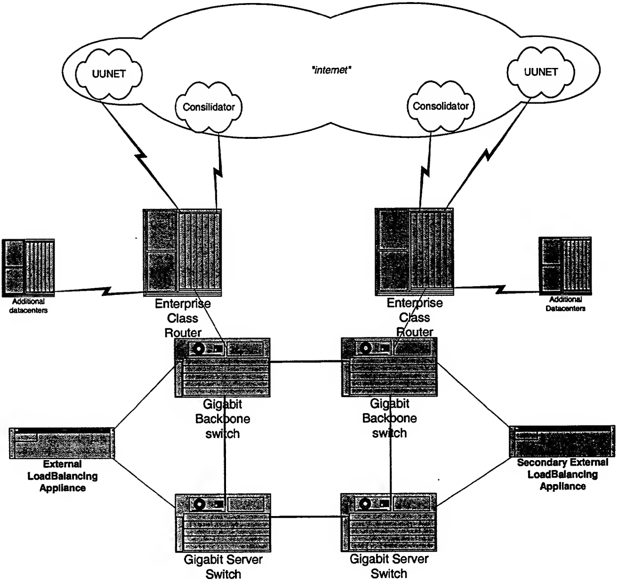
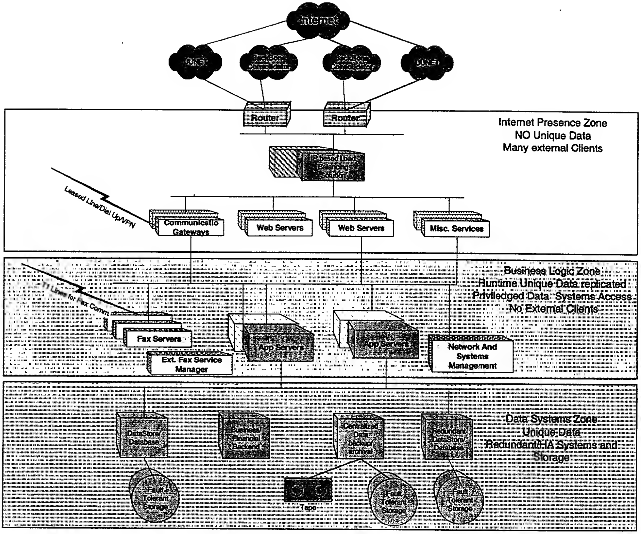
7 System Design/Implementation Recommendations

7.1 Network/System Architecture



7.2 System Tiers



7.3 Detailed Systems Architecture Features

The network will be built with the following items.

7.3.1 No Single Point of Failure

- Redundant hardware
- Redundant local loop providers
- Redundant ISPs
- High performance internal network
- Switch-based
- Gigabit or better backbone
- High performance Internet connection

- Multiple connections to Internet
- Connect only to major backbones
- Overbuilt with excess capacity for peak demand
- Use cache servers or services for optimized performance

7.3.2 System Architecture

The overall system architecture has three zones with the following characteristics:

7.3.2.1 The Internet Presence Zone:

- Many external clients
- Support vagaries of Internet "weather"
- High level of security/fortification
- Limitless or near limitless scaling
- No unique data in Internet connection zone
- Isolates business logic zone from Internet
- Low latency server and network performance
- High capacity support for many concurrent clients

7.3.2.2 The Business Logic Zone

- Runtime unique data replicated
- Privileged data systems access
- No external clients
- Vertical and horizontal scaling
- Multiple business logic systems can execute concurrently
- System and network management

7.3.2.3 The data systems zone

- Storage of all unique data stores
- Redundant storage devices
- Hardened data store servers
- Only accessible from the business logic zone
- Centralize data backup and archival
- Disaster recovery support

7.3.3 Database Architecture

The physical database architecture is based on meeting the business requirements for very high capacity and very low latency (high performance). This will dictate the following:

- High performance/high availability storage

- Hardware RAID storage systems with support for redundant controllers and interfaces
- Multiple CPU servers with support for large installed memory
- Typically Enterprise class Unix servers with 64bit memory addressing to support greater than 8GB of memory
- Possible exploitation of in memory databases
- Use such a product in front of traditional relational database
- Exploit object databases as appropriate
- As dictated by logic or data types

7.3.4 Management Systems

There are basic themes or strategies to the management system that will be adhered to. The CONVEX system will have system and application management, and they system will have network management. Systems will be built or purchased to deliver these goals as efficiently as possible.

7.3.4.1 Focus on managing business deliverables rather than resources

Using a car as an analogy—the speedometer measures the business deliverable, and the tachometer measures a resource used to gain travel…the engine RPM. It is common to deliver a system or software package that includes the tachometer, but often little or no consideration is given to the speedometer.

7.3.4.2 Management systems should be lightweight

The management system needs to be lightweight and simple to manage.

7.3.4.3 Automation, Automation, and Automation

Computers are devices for automation. Therefore, the systems that manage computers should also be automated. This dictates the architecture.

7.3.4.3.1 Automation requires correlation.

Automation requires the correlation of system information to enable automated intelligent decisions and actions.

7.3.4.3.2 Correlation requires centralization

- Management data must be centralized to allow for intelligent correlation. There are two disparate data sources. These data sources could be correlated separately and with their respective correlation results used for cross-correlation.
- System and application events need to be centrally visible, collected and correlated. This data is best known as the source data for alert notification.

- System and application statistics need also to be centrally visible, collected, correlated and archived. This data is best known as the source data for performance graphs and statistical analysis. This data, via thresholds, is also used for alert notification and event correlation.

7.3.4.4 Web-based interfaces

The preferred interface to the management systems is the browser.

7.3.4.5 Open standards.

Proprietary standards and interfaces are to be discouraged.

7.3.4.6 Performance

Performance characteristics vary by zone and role

7.3.4.6.1 Internet Presence Zone:

This zone is usually built with a number of identical, low-cost servers. Often these are single-purpose servers replicated many times for capacity and fault tolerance. Disk usage here is minimal. System tuning is performed to optimize the servers for the role that they perform.

7.3.4.6.2 Business Logic Zone:

Compared to the Internet presence zone, these machines tend to be slightly larger, but primarily remain single-function servers replicated for fault tolerance and capacity. Disk usage remains minimal, but memory and CPU usage is greater for each machine. System tuning is performed to optimize the servers for the single role that they perform.

7.3.4.6.3 Data Systems Zone

This zone is inhabited by fewer large servers, and in some cases, multifunction servers. This need requires high disk IO capacity, large memory footprint support (preferably 64bit memory addressing), and SMP support for multi-CPU servers. System tuning is more complicated (for multifunction servers), hence the need to overbuild these critical servers with excess CPU and memory.

7.3.5 Redundancy and Scalability

There are two strategies for redundancy and scalability in this system architecture.

7.3.5.1 N+X Server architecture

The Internet presence and business logic zones do not have a large amount of unique data, so they are well suited for N+X scaling. In general, the server systems consist of N+X identical servers supporting the identical business functions. The capacity needed of the system requires N servers,

but X additional servers are installed for excess capacity and protection against a server failure. Should a server fail, some capacity is lost, but there is no impact to delivering the business function to the customer.

7.3.5.2 *The Big N architecture*

The data systems zone includes large amounts of unique data. This dictates large, hardened servers. These servers tend to grow in size rather than number. The server platforms are chosen to minimize or eliminate single points of failure. Disk subsystems have protected (RAID) disks and support for controller and interface fail-over. Some databases might need to be built for complete fault-tolerance and recovery. This will require clusters, database replication, or some other scheme to guarantee uninterrupted access to this unique data.

7.3.5.3 *Security*

The three system zones also represent three different security zones:

- The Internet presence zone is the only zone directly accessible from the outside world. IP traffic is limited to what is necessary for the business deliverable. Individual machines are hardened and locked down for tight security. These machines are also closely monitored for break in attempts, denial of service attacks, and unauthorized alteration.
- The business logic zone is the only internal zone accessible from the Internet presence zone, and traffic between these two zones is closely controlled. These machines will also be hardened and locked down for tight security. These machines are not directly accessible from the Internet since they do have some runtime unique data. This zone is the only zone that can connect to the data systems zone. Since this zone has visibility into the other two zones, the management and security systems are located here.
- The data systems zone is only accessible from the business logic zone. Any other connectivity will be strictly limited and monitored. For further measure, these machines will also be hardened and locked down for tight security.

7.3.5.4 *Facilities*

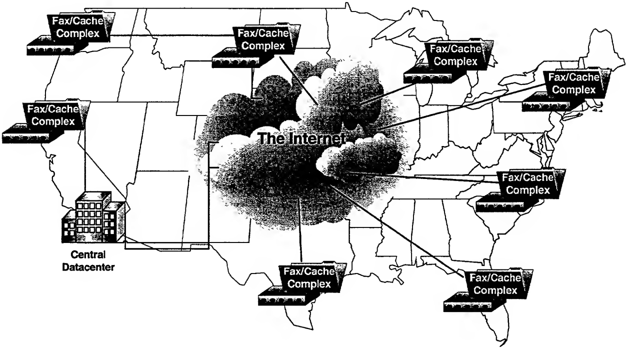
There will most likely be two types of facilities:

- The central data center must be built as a standard, mission-critical data center with UPS and generator backed power, redundant AC, fire suppression system, a premises or physical security system, excess space to accommodate rapid growth, and staging space for system upgrades and new technology.
- The distributed fax/cache complexes will likely be housed at collocation facilities that are built similar to the central data center, but these facilities will be built and managed by a vendor.

7.3.5.5 *Centralized Internet Architecture*

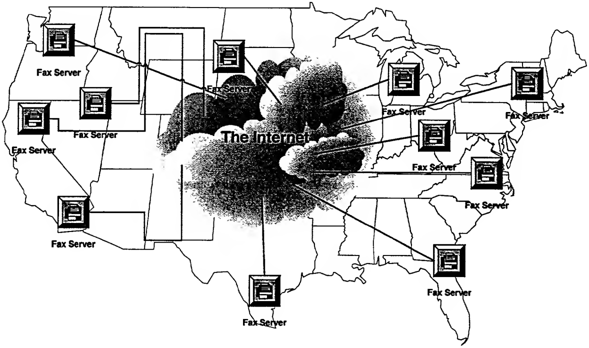
The cost of managing distributed data centers is much greater than that of centralized data centers. Distribution should be closely aligned with business requirements. For CONVEX, the requirement

is to minimize facsimile costs and to ensure high performance/low latency Web site performance. The combination of a centralized data center with distributed content servers and fax servers will meet the business requirements with the lowest possible cost. Disaster recovery can be handled using outsourced disaster recovery services, or if financially justifiable, by the addition of a hot backup data center. Having centralized data centers does not preclude having staff at remote offices. This document only addresses the system and network architecture.



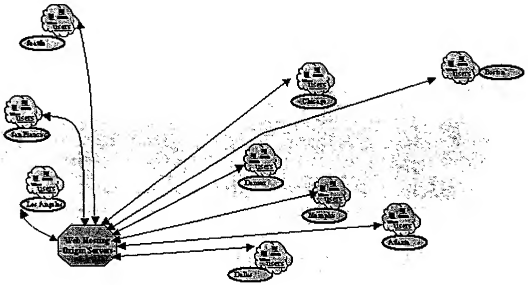
7.3.5.6 *Distributed Fax Services*

Once cost justification is reached to replace fax services with a fax server network, fax servers will be distributed in a manner to minimize telephone toll charges. This would also have to be compared against the cost of centralizing the servers and paying negotiated, bargain basement, long distance charges. Internet connectivity would be the transport medium for fax server communications and the high cost of a private WAN should be avoided.



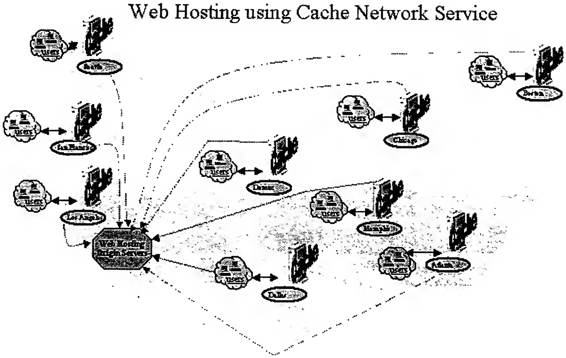
7.3.5.7 Normal Centralized Web Hosting

Normal Centralized Web Hosting



◄─► All request/reply for web content traverses the backbone and is delivered by web server/farm at hosting center.

7.3.5.8 *Web Hosting via Cache Network Service*



←→ Content from replicated web site is delivered locally (transparently) to the users from the nearest cache server. requests.

→ Only the cache servers communicate with origin servers, at web hosting. Content is replicated as users request it.

7.3.5.9 *Internet Connection Zone Characteristics*

- Many external clients
- Support vagaries of Internet "weather"
- High level of security/fortification
- Limitless or near limitless scaling
- No unique data in Internet connection zone
- Isolates business logic zone from Internet
- Low latency server and network performance
- High capacity support for many concurrent clients

7.3.5.10 *The Business Logic Zone*

- Runtime unique data replicated
- Privileged data systems access
- No external clients

- Vertical and horizontal scaling
- Multiple business logic systems can be parallelized
- System and network management

7.3.5.11 The Data Systems Zone

- Storage of all unique data stores
- Redundant storage devices
- Hardened data store servers
- Only accessible from the business logic zone
- Centralized data backup and archival
- Disaster recovery support

7.4 Collocation Overview

This issue is often decided by personal philosophy and/or comfort level. Financially, the costs can be presented to favor and disfavor system collocation over self-hosting. It benefits any new venture to simply follow the patterns and trends in the industry. The most prevalent and pertinent pattern has been for a firm to begin small and self-hosted in inappropriate conditions. The company grows and decides to rectify the situation and chooses to use collocation to preserve cash flow and move quickly. These firms subsequently are successful, grow very large, and tend to desire the relocation of their systems to their own data center for various business related reasons. Technically there is almost never a reason not to use collocation. The decision should be based on business requirements.

7.4.1 Recommended Plan for Hosting

Plan on starting out with collocation maintaining the understanding and planning to support moving the system in-house (at some major point in the system's growth-curve). Use this time to prevent committing any capital costs related to the data center prior to experiencing the dynamics of the system, its changes, and its growth.

As the company's revenues are generated by the system, in time, it is likely that the contractual agreement with the collocation vendor will no longer provide the comfort level desired in delivering the level of service customers' require. The need to differentiate from the competition, the sensitivity of data stored in the system, and the shear size of the system will favor moving the heart of the system in-house to a centralized, company-controlled data center. The front-end may or may not move in-house, but the use of a cache network will always represent a collocated, outsourced front-end system.

Yahoo! best exemplifies this model. Yahoo! maintains strict control of the systems that generate dynamic content, but static content and ancillary services are collocated or outsourced to Yahoo! subsidiaries.

7.4.2 Major Hosting Providers

7.4.2.1 *AboveNet*

Strong data center and strong network, but not in Southern California, yet.

7.4.2.2 *InterNap/Level 3*

Very strong network, data center not manned, Irvine in 11/99.

7.4.2.3 *Frontier GlobalCenter*

Very strong hosting services and network, data center in Anaheim 11/99.

7.4.2.4 *Exodus*

Very strong hosting service, data center in Irvine (currently our of space) and El Segundo.

Both InterNap and AboveNet rely on partnerships to provide value-added services. Currently AboveNet's partners are stronger than Internap's, and thus, they are listed first. InterNap is moving aggressively in this area and may be more strongly positioned by the time a choice is made. GlobalCenter and Exodus have concentrated on hosting services at the expense of their network engineering, and many of their customers are addressing that situation by requiring Exodus or GlobalCenter to allow InterNap to provide connectivity to their collocated systems.

7.5 Staffing for System Operations Support for Phase One Rollout

Staff will be necessary for customer support and is not addressed in this document. The staffing (described below) is to support mission-critical systems with no acceptable downtime, and is intended to grow with the system. Additional staff can be filled with mid-level and entry-level candidates as the existing staff grows in experience and skill set. There may be a need for specialized skill-sets as the system grows, such as:

- Network engineers
- System management specialists
- Disaster recovery specialists
- Capacity planning specialists
- And more

These needs will be based on the strengths and weaknesses of the existing staff, and will be greatly influenced by the dynamics of the system's evolution.

7.5.1 System Operations Support Responsibilities

System operations support owns system availability and performance, such as:

- Monitoring system performance.
- Handling all necessary system interventions.
- Handling all normal system maintenance activities.
- Version upgrades, patches, file system maintenance, and log analysis.
- Handling all vendor fix coordination.
- Installing any new software and/or systems.
- Managing system capacity.
- Interfacing with all vendors.

7.5.2 Phase One Staffing and Roles

7.5.2.1 System Engineers

Responsible for building and configuring all hardware and software systems.

7.5.2.2 System Administrators

Typically, this is staffed by senior operation system administrators.

7.5.2.3 Database Administrators

Responsible for building, configuring, and administrating all databases, as well as engineering data availability systems (such as, backup, archive, and recovery). Typically, a senior database administrator with some system administration experience is ideal.

7.5.2.4 System Operators

Responsible for monitoring and administrating systems engineered by the system engineers and database administrators. Typically, this is staffed by mid and entry-level system and database administrators.

7.5.3 Recommended Staffing Level for Phase One

7.5.3.1 System Engineers

One senior Unix System Engineer with Internet and networking experience.

7.5.3.2 Database Engineer

One senior Oracle Database Engineer with Internet experience.

7.5.3.3 Early Shift Operators

One mid-level Unix system admin with some database knowledge, and one entry-level Unix system operator.

7.5.3.4 Late Shift Operators

Two operators for an early shift operations staff.

7.5.3.5 After-hours/weekend coverage

Staffed with either entry-level Unix system administrators, or staffed (by contract) with a collocation vendor or third-party support organization.

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8 Third-Party System Components (Web E-mail/PIM/Chat)

8.1 Overview

This information is provided as a rough guide to products that the CONVEX site might utilize. The list is not final. Some products have been evaluated, but not all. Factors used in selecting potential candidates include:

- Product features meet functional requirements.
- Product has a configurable look and feel to facilitate blending into the CONVEX Web site look and feel.
- Application utilizes scalable technology and architecture.
- Application administration and user interfaces are appropriate for the skill level of users interfacing with those components.

8.2 Web E-mail and Personal Information Management (PIM)

Vendor	Pricing	Administration/ Management	User Features	Customers
USA Net	• 1 to 2499 mailboxes are $1.40 a box per month ($3500) • 2500 to 4999 mailboxes are $1.20 a box per month ($6,000) • 5000 to 9999 mailboxes are $1.00 a box per month ($10,000) • 10000 and up are $0.80 a box per month	• Add/remove accounts • Activity Reports • Branding • Seamless API	• Junk Mail filter • Vacation reply • POP3 e-mail collecting, • Scheduling of reminders–B-days, etc.	• Netscape • American Express
Commtouch	• 1 to 10000 mailboxes are $2100 per month • 10001 to 20000 mailboxes are $3400 per month • To include the calendar function is an additional $0.60 a box per year ($6000 per 10000 mailboxes per year)	Similar to USA Net	Similar to UAS Net	• Discovery Online • Seventeen.com • Fortune City • Excite • Netopia • Colleges.com • Headbone.com

8.3 Web Chat

Vendor	Pricing	Administration/ Management	User Features	Customers
Web Crossing	• 250 concurrent users - $895 • 20,000 users + messages add $695 • 200,000 users + messages add $2,495	• Browser based admin • Email validation • Display banner ads • Read-only conferences • Multi platform	• HTML based – low tech feel • Customizable • Search engine • Profanity filter	• CNN • CitySearch • C|net • Lycos • NY Times
DigiChat	• Chat $995 • Moderated Chat Option $995	Remote admin Multi platform	Java client/slick look and feel • Upload personal icons • Simple to use • Profanity filter	• Cable and Wireless • Matchmaker.com • The Internet Movie Database • Harvard University • Scientific Atlanta
Webmaster	• $1,500 for 1,000 concurrent users • Scribe (Transcript module) $495 • $4,295 for 10,000 concurrent users		Java client	O'Reily WebBoard utilizes the conference room component

8.4 Web Application Development Platforms/Databases

Vendor	Pricing	Administration/ Management	User Features	Customers
Bea (Weblogic)	• Per clustered CPU: $15,000 • Per non-clustered CPU: $10,000	• Web based • Connections • Load • Performance • Errors/ Exceptions	Enterprise Scale Application Server Platform	• American President Lines • Amazon • Bear Stearns • Bell Atlantic • Corporate Express • Covad Communications • Fidelity Investments • FirstUSA, Merrill Lynch • priceline.com

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Vendor	Pricing	Administration/ Management	User Features	Customers
				- Qwest Communications - TRIP.com
Oracle	Lists for $2,000 per concurrent user	GUI admin client	TBD	Everyone

9 System Components List (ROM Pricing)

Below describes hardware and software for a best-of-breed portal site, which is fully redundant (high availability) with a mainframe class system.

9.1 System Component Overview

This information is provided as a rough guide for planning purposes only. The number of systems required for each type will vary based on factors, such as:

- The number of Web hits the site will receive during peak hours. 10 million hits/day (or 700,000 hits/peak hour) is used as the starting point for calculations.
- The number of transactions that will be generated as a result of Web hits (eBuilt estimates two transactions per second).
- The amount of fault tolerance desired.
- Application complexity.

9.1.1 Front-End Systems (4)

- Sun single processor commodity servers.
- IBM Websphere (Web Server component includes SSL support).
  - Cost Est. $1,000 per server = $4,000 total
- Hardware Assist for SSL (card per server or via Ethernet switch)
  - Cost Est. $5,000 per server = $20,000 total
- System Metrics and System Management agents.
  - Sample Hardware System Cost:
    - Sun Netra T1-360 512MB memory single 9GB drive (4x) $7,000
    - Server Hardware: ~ $28,000

Total approximate cost for front-end systems: $55,000.

9.1.2 Application Servers (4)

- Sun mid-range (2) CPU servers.
- BEA Web Logic Application Server or IBM Websphere.
  - Cost Est. $15,000 per CPU = $120,000
- System Metrics and System Management agents.
  - Sample Hardware System:
    - Sun E250 2GB memory 2CPU, FibreChannel intfc $30,000
    - Shared Raid Storage Array $20,000
    - Total 4 Servers and 2 Arrays = ~$160,000

Total approximate cost for application servers: $280,000.

9.1.3 Database Servers (2)

Upgradeability and reliability are key requirements.

- Sun Enterprise class Servers (supporting 8+ CPUs and 8+ GB RAM).
- External disk subsystems (RAID 0+1 -mirrored stripe). External disk would be shared for fault-tolerance if multiple database servers and high availability features were deployed using the Enterprise version of Oracle Database Server.
- Oracle 8i Enterprise Database Server with HA options.
  - Cost of 50 Concurrent Users $100,000 (x2 for the redundant system) = $200,000
- System Metrics and System Management agents.
  - Sample Hardware System:
    - Sun Enterprise E5500 with 4CPU's and 4GB RAM (initial) = $170,000
    - Enterprise Storage Subsystem 100GB (initial) = $40,000
      - Total Two Systems with 2 Storage arrays = $420,000

Total approximate cost for database servers: $620,000

9.1.4 Management Systems (4)

To monitor system performance and availability and perform global management tasks.

- SNMP monitoring and reporting tools (HP OpenView, IBM Tivoli/NetView, and so on).
  - Estimated Cost = $100,000
- System availability monitoring software tools.
  - Estimated Cost = $80,000

Total software cost: $180,000

- 2 Intel commodity PCs as workstations.
  - Estimated Cost = (2x) $2,500
- Sun 2 CPU management server.
- Sun 2 CPU system monitoring and data collection server.
  - Sample Hardware System:
    - Sun E250 with 2CPU's 2GB RAM, FibreChannel Interface (2x) $30,000
    - Shared Storage Array $20,000 (shared between the (2) 2 CPU systems)

Total hardware cost: $85,000

Total approximate cost for management systems: $265,000

9.1.5 Network Equipment

- Cisco Catalyst Ethernet switches with Gigabit Ethernet uplinks for backbone.
  - Est. Cost $50,000 (x4) total $200,000
- Cisco 75XX class routers with appropriate interfaces and min. 96M of memory.

    - Est. Cost $100,000 (x2) total $200,000
- 2 Cisco Local Director 420s for load balancing.
    - Est. Cost = $20,000 (x2) total $40,000

Total approximate cost for network equipment: $440,000

Approximate total for all the identified hardware and software: $1,660,000.

10 Third Party Technologies

Below describes technology that will be required for CONVEX system development.

10.1 Publish/Subscribe Messaging Middleware (MOM)

Publish/Subscribe messaging middleware is a key technology for building robust, scaleable systems. The CONVEX system will leverage MOM to:

- Asynchronously broadcast documents to services
- Communicate status
- Common messaging bus to interface and integrate other systems
- Broadcast news to front-end servers
- Broadcast project status to front-end servers
- Send content updates to multiple servers
- Update a user's state across several servers

This technology will be the primary glue between systems. Common messaging formats and semantics will be defined between systems and subsystems.

10.1.1 Key Manufacturers

10.1.1.1 TIBCO TIB/RV (http://www.tibco.com)

- Technology used by NASDAQ, Reuters.
- Pioneer of Publish/Subscribe subject-based addressing.
- CISCO implements TIBCO reliable multicast technology in their hardware.
- Co-Author OMG messaging standard.
- Network Management Hooks.

10.1.1.2 Talarian SmartSockets (http://www.smartsockets.com)

- Aerospace roots, deployed by MCI for per call fraud detection.
- Employ's GlobalCast's Reliable Multicast Technology (Lucent's RM technology).
- High burst rates due to message coalescing.
- Strong monitoring tools.

10.1.1.3 Vitria (http://www.vitria.com)

- Technology developed by former TIBCO and Sun engineers.
- Leverages object technology.
- Next generation technology.
- Several key customers.

10.1.1.4 *Global Cast (http://www.gcast.com)*

- Technology developed by Lucent.
- Leading edge RM technology (reliable multicast).
- Next generation technology.
- Presently C/C++ API only?

10.1.1.5 *IBM MQSeries Messaging (http://www.ibm.com)*

- Leading traditional MOM.
- Popular in EAI market.
- Mature implementations available on legacy hardware.
- Strong Java bindings.
- Moving into P/S world.
- Co-Author OMG messaging standard.

10.1.2 Broadcast Faxing (IP or Internet Originated)

10.1.2.1 *Key Players:*

10.1.2.1.1 Premiere Technology (formerly Xpedite)

- Claims to be largest Broadcast fax entity.
- 20,000 parallel faxing capability.
- Willing to develop custom interfaces.
- Seems to be a feature fit.
- Sales folk visit and call back!

10.1.2.1.2 UUFAX

- Key Internet backbone player.
- Unknown volume and capacity.
- Does not return calls.
- National per page rate .07.

10.1.2.1.3 AT&T IP Fax Solutions

- Leverage large national backbone.
- Unknown volume and capacity.
- Two calls with promises to call back…and no call-backs.

10.1.2.1.4 TGIVAN (PopStar IP Fax)

- Unknown player.
- Questions in route, no answers yet.

- Have demo access to Web site service.

10.1.3 Document Imaging Software (ICR and TIFF Processing)

10.1.3.1 Key Players

- Kofax
- Filenet
- ImageLib
- Accusoft
- Xerox ICR Forms
- Wang
- Xionics

11 Functional Matrix

The Functional Matrix is for managing and summarizing project expectations and goals.

Item	Requirement	Reference	Check
	Introduction and Overview		
1.	The CONVEX system will bring the construction business into a complete, automated online system that integrates project management, bid management, and supply chain functions in a centralized Internet system.	on page 1	
2.	Ultimately, the CONVEX system will be the catalyst for a new business model that changes or eliminates common roles in existing business models (paradigm shift), saving the industry billions in overhead by facilitating resource reduction, time, and efficient resource management.	on page 1	
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	The Bid Management System		
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	System Design		
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	User Experience		
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	System Design/Implementation Recommendations		
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12 Appendices

Convex Functional Specifications—Phase I

Prepared By: Larry Wares
State of document: Draft #1
Phase of project: Phase I

Introduction

The Convex Portal will ultimately become the "Yahoo" or "AOL" of the Commercial Construction Industry. The ultimate end-state of Convex is to become the place where the construction community comes to do business – buying, trading and acquiring new business and industry-related information.

Web adoption will be slow at the targeted mid-sector or subcontractor level; therefore, a phased implementation plan that drives eyeballs into the site for new business at little or no service fee will drive the business strategy.

Phase I

Phase I consists of creating a communication service and portal that enables general contractors to communicate via fax and e-mail with subs and suppliers.

Phase II

Phase II expands the capabilities of the portal to enable the exchange of plans, specifications and other bid-related documents among Phase I users.

Phase III

Phase III expands the capabilities of the portal to procurement and purchase management for building materials and products – including auctioning of surplus products and materials.

Targeted Users

General Contractors

Subcontractors
Suppliers/Distributors/Building Product Manufactures(BPM)

Additional Users

Owners (Developers, Government Agencies, etc.)

Architects
Engineers
Blue Printers
Industry Consultants
Insurance and Bonding Agencies
Financial Institutions

Other Construction Service-related firms

System Administrators

Convex Users

Database maintenance personnel
Sales and training personnel (demonstration data)
Technical support staff & development engineers

Scope of Features – Overview

Generally speaking, the heart of Phase I will be the "BidFax"-like features. General contractors will use the portal to broadcast faxes and e-mails to a specified list of bidders. Bidders typically are made up of subcontractors who are categorized by industry standard trade codes. Recipients will either RSVP by fax, e-mail or by direct entry into the portal – the latter being the ultimate goal. Larger subcontractors will perform many of the same solicitation effort of a G.C. to suppliers and distributors; therefore, forwarding information within a secured portal creates a high value proposition. When Phase II is complete the portal will offer all participants secured access to plans, specifications and other bid-related documents. Phase I's two primary features will be BidFax-on-the-web linked to a public database of subs and suppliers. The portal must be engineered to scale to Phase III and must be designed as a user-smart interface (front-end is look and feel and content specific to industry segments – electrical subs see electrical stuff, etc.).

Scope of Features – Detailed

Directory

An industry-specific directory of Architects, G.C.'s, subs, suppliers, wholesalers, distributors, BPM's and other service-related consultants will feed the bid solicitation capabilities required by the G.C.'s. The database will contain approximately 1.5 million records. Subcontractor records make up the bulk of the database at approximately 800,000 records, the balance of which is a mixture of the above. We will offer three levels of database services as follows:

Bronze – Basic listing (Free)
Silver – Enhanced Listing (Pay level 1)
Gold – Enhanced Listing & Custom Page (Pay level 2)

Basic listings will contain approximately 20-25 fields of data, the most critical being trade reference/CSI code(s), preferred type of work and geographic work preference. It is important to note that the physical location of the sub may not be related to the geographic work preference(s). Utilization of pick-lists and geography maps to associate consistent data with records will be required for ease of use. The following list of fields represents a typical Bronze record:

Bronze Listing

1. Company Name
2. Work Phone Number (Duplicate search upon entry)
3. Contact 1
4. Contact 2
5. Work Fax Number

6. Mobile Phone
7. Pager
8. E-mail
9. Web Site
10. Address 1
11. Address 2
12. City
13. Sate
14. Zip
15. Bid Range (2 Pick lists – Min. value and Max value – overall job size, not trade size)
16. Labor = Union, Open Shop, Open Shop/Prevailing Wage
17. M/W/D/V/S (Minority, Women, Disadvantaged, Veteran, Small Business)
18. Trade(s) (Pick-list from master UCI/CSI format (See list attached)
19. Geographic Preference (Use map to identify wide geographic range or narrow down to one or several cities.)
20. WorkType (Use pick list supplied by Convex, i.e., Schools, Industrial, Retail, etc.)
21. Trade x-reference (Used to associate master UCI/CSI list with in-house list)
22. User Field 1
23. User Field 2
24. User Field 3

Silver Listing

The Silver listing adds a few more fields that represent performance, credibility and reference checking capabilities for automated due-diligence. Silver listings have priority over Bronze when a G.C. is picking subs for a new bid (Gold list before silver, silver before Bronze). The priority listing capability is one driver of the business model. The added fields for Silver are as follows:

1. Bonding & Insurance Information (Capacity, Agent, Rating)
2. Annual sales volume
3. Number of employees
4. Officer contact (3 contacts)
5. Marketing contact (2 contacts)
6. Financial contact (2 contacts)
7. Field contact (2 contacts)
8. Emergency contact (3 contacts)
9. Credit History (D&B or equal – Possible link to credit services burrow)
10. Project reference (Previous successful projects & links)
11. Business References (Up to 5 key references & links to e-mail)
12. Convex rating (Future quality rating system managed by Convex)

The Gold listing contains a fully maintained custom page designed by Convex. The personalized page will contain standards and service points designed around the ultimate end-state of the Convex service portal. This may include financing, banking, marketing and other basic B2B services that help subs and suppliers build their business. Phase I; however, will be limited to designing and maintaining the basic page, and may be subcontracted to a web page design service company. Page construction may also be performed outside of the Convex design group as long as

Convex design standards are met.

Gold Listing

Target User-Interface

Performance and usability are of utmost importance. As mentioned earlier, the mid-sector of the A/E/C industry (subs) are far from being computer literate and must not be intimidated by the user interface. We will be working with a group of individuals that have little or no tolerance for bugs, or confusion about what the next step is. We must provide a strong balance between a professional looking, but almost elementary-style basic GUI. Numbering data entry or service option steps may provide a clear action path for our users – Step 1...... Step 2 .... Step 3....

A good example of a simple UI approach is AOL. While some of the more sophisticated users my think AOL is almost goofy looking the bulk of AOL's value is a direct reflection of their low mortality rate. We want to create UI that combines the speed of Yahoo with the simplicity of AOL. This is a critical design issue that drives the entire business proposition.

Misc.

1. G.C.'s will want the capability of having their own private database of bidders. Public database records should link with the G.C.'s private database – this will reduce the onerous responsibility of database maintenance by the G.C.
2. Area codes are always changing. Convex administrators must have the ability of mass updating the database by associating new area codes to certain prefixes. This will be an on-going maintenance issue. If the process can be automated with local phone companies, it would greatly enhance the system maintenance requirements.
3. An import routine must be provided for quick set-up of the G.C.'s private database. Integration of data from BidFax, Outlook, Act and other contact management systems must be supported. A simple ASCII import with field-to-field mapping will be required.
4. "Quick Fax" and e-mail templates must be provided for all users browsing the public and private database. Marking one or several recipients, then a fax or e-mail template with mail merge will be required. These are typically non-bid-related communications. Bid-related communications will take place within a bid portal.
5. Faxes and e-mails can only be sent by registered users. Fax and e-mail abusers will be terminated from the system. Security measures must be put in place to control this. We may want to prepare canned templates that are monitored by the system.
6. Different views of the data must be supported – Single line view, full page per sub view, etc. If user definable can be supported without much pain to the user then do it! At a minimum, allow custom column viewing set-up for single or double line views.
7. The public database will be copyrighted, however, we must provide a way to disallow downloading, OCR or any other mass copying of our data.
8. Basic printed reports must be supported. Reports will be defined in the design spec. Most of the reports will be required at the private database level.

Functional Specifications

Bid Manager – Phase I

Convex Technologies, Inc.

Executive Summary

Convex's Bid Manager is a Pre-Construction Services Portal that enables commercial construction communities to participate in more efficient and cost effective bidding practices.

The construction industry traditionally relies on manual methods of bid collaboration, and while two of the industry's leading news and project information services have improved the offering of computerized data, no single entity has attempted to provide a comprehensive mechanism that offers all of the components required to process an accurate and timely bid. In addition to offering news and information about upcoming bids, Bid Manager's portal will enable a more efficient connection of audiences by providing the following services:

1. Fax and E-mail Bid Solicitation for General Contractors and Subcontractors
2. Comprehensive Database of Subcontractors, Suppliers and Building Product Manufactures
3. Bid collaboration tools for Architects, Engineers, General Contractors and Subcontractors
4. Selective downloading of electronic plan images
5. Key-word search and downloading of project specifications
6. Networking over 1,200 blueprinters for hard copy reproduction of bid documents
7. Electronic Bid Submission
8. Historical tracking and electronic Bid Results
9. General services including e-mail, weather, trade association links, news & events, Etc.

Bid Manager's success will be directly related to the following critical assumptions:

1. Plans and specifications can be seamlessly converted from their native .dwg format to a "Read Only" format that can be utilized for viewing, electronic estimating and digital printing
2. Development of a security mechanism that offers all levels of open or restricted access
3. An application interface that combines standard design and usability features with the idiosyncrasies of the construction community
4. Utilization of the best available technology for the internet

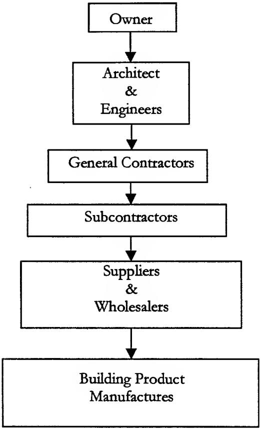
In an industry where time and information are highly strategic components of the "New Business" process, Bid Manager stands to offer what nearly all successful business are willing to pay for ***– A***

tool that minimizes resources and increases profits. We have the technology. Data and other critical business components are readily available. The construction industry has been primed for Bid Manager. Raw talent and speedy execution will determine the stake that claims this new and exciting space.

Industry Overview

The systematic, almost methodical, bid process experienced by today's construction industry is a result of nearly 150 years of competitive bidding; and while the projects and players may differ from bid to bid the goal remains unchanged – ***To obtain the lowest possible price for the best possible materials and labor.***

Byproducts created from the evolution of this process were eventually converted to standards. Construction professionals in North America and Canada have adopted many of these bid practice standards, one of which is the final deadline for bid submission at 2:00 PM -- ala ***Bid Manager.*** In addition to bid submission standards architects and engineers believed that organization of the bid documents by trade discipline would result in better bids. Today plans and specifications are prepared in a way that enables all participants to narrow down their required scope of work and submit a qualified bid. The model below represents how the organization of bid information resulted in a complementary business hierarchy:



1. Owner purchases land and employs the services of an architect and other consultants
2. Architect employs services of specialty engineers and consultants
3. Architect prepares bid documents
4. Architect and owner seeks low bids from qualified general contractors
5. General contractors seek low bids from qualified subcontractors and suppliers
6. Subcontractors seek low bids from suppliers, wholesalers and building product manufactures
7. Suppliers and wholesalers seek low bids from specified building product manufactures
8. Building product manufactures submit bids
9. Suppliers and wholesalers submit bids
10. Subcontractors submit bids
11. General contractors submit all-inclusive bid

While the above model appears to conform to a typical business transaction structure one should note that an intense strategy for winning the low bid exists within system. The community will not accept merely providing a better vehicle for information dissemination -- they will expect to maintain their ability to prepare a competitive bid. The framers of Bid Manager must be cognizant of the specific requirements of competitive bidding as outlined in sections to follow.

Bid Process Overview

This section will describe the fundamental steps of the bid process. Emphasis will be placed on describing the unique roll each segment plays in the process. Bid Manager's infrastructure and interface should be flexible enough to accommodate "Look and Feel" customization by segment.

Types of Bids

Bid Manager will be primarily designed to meet the needs of the commercial/industrial and building industry; however, consideration for US infrastructure projects such as roads, dams and bridges should be implemented into the roots of the system for future use (see supplemental infrastructure design documents).

There are typically five (5) types of bid scenarios -- they are as follows:

1. **Public Works (City/State/Federal Government)** – Typically public works projects are open to anyone and everyone that qualifies to bid the project. Highly competitive bid environment. Strong consideration for "Equal Opportunity Employment" exists in most states. Preferential bidding, based on race, continues to be challenged across America. No such bidding criteria exist in Canada. Fields describing Minority, Women, Disadvantaged Veterans and Small Business may become a critical option for database design.
2. **Private Competitive Bid** – Private ownership(s) where more than one General Contracting bid is desired. Heavy competition amongst general contractors and subcontractors. Provisions for Union Labor may be required if funds come from Union lending institutions. Prevailing labor rates may be mandated if a portion of the funds come from a Government funding program. Database design should allow for identification of Union or Prevailing Wages.
3. **Negotiated Bid** – Ownership places confidence in a single General Contractor. General Contractor will solicit bids from qualified subcontractors and suppliers. Provisions for Union Labor may be required if funds come from Union lending institutions. Prevailing labor rates may be mandated if a portion of the funds come from a Government funding program. Database design should allow for identification of Union or Prevailing Wages.
4. **Design/Build** – Ownership selects one general contractor to assist architect with design and bid documents in order to meet the constraints of the development budget. Some design/build contracts call for the General Contractor as the lead in lieu of the Architect. General Contractor will solicit bids from qualified subcontractors and suppliers. Provisions for Union Labor may be required if funds come from Union lending institutions. Prevailing labor rates may be mandated if a portion of the funds come from a Government funding program. Database design should allow for identification of Union or Prevailing Wages.
5. **Re-Bid** – Sometimes a project will either come in over budget or the economy may adversely change and delay the bid award process. In these case a project may com out

as a re-bid. For this reason provisions within the database design must accommodate re-bid projects.

Project types 2, 3 and 4 will require tight security controls that empower the owners, architects and general contracts with the ability to keep the project from getting into the hands of their competitors. This will be of great concern to Owners, architects, engineers and general contractors.

The Owner

Owners are typically comprised of the following entities:

1. Single entity/private ownership
2. Partnerships and joint ventures
3. Corporations (Wal-Mart, McDonalds, Etc.)
4. City, State and Federal Government agencies

While the owners roll in the bid process is typically limited to performance motivation, they will always want to have their fingers in every aspect of the process. The owners' main goal is to secure the financing and employ consultants that meet or beat the expectations of the financial pro forma.

Identifying qualified consultants and collaborating within Bid Manager will provide great value to the owner. Typical collaboration expectations from the owner are as follows:

1. Delivery of Request for Proposals (RFP's) to qualified architects and engineers
2. Exchanging design and building program requirements with architects and engineers
3. Identifying qualified consultants and requesting information about their services
4. Organizing meetings and job site visits with team members
5. Identifying qualified general contractors by work type and prior performance
6. Delivery of Request for Proposals (RFP's) to qualified general contractors
7. Reproduction and delivery of plans and specifications
8. Searching for and viewing currently available building product materials and requesting preliminary pricing
9. Providing press releases and other public relations information
10. Marketing and sales of real estate

The owner of the project will become a key advocate of Bid Manager's efficiency capabilities.

Architects and Engineers

Architects are typically expected to lead the bid process. Following receipt of a signed contract from the Owner the Architect will commence preparation of the following documents:

1. Preliminary schematics – Typically consists of a site plan, floor plan and conceptual elevations.
2. Preliminary plan submission to City – Agency specific requirements, but typically includes preliminary schematic documents accompanied by form documents provided by the local City or County.
3. Preparation of Bid Documents – Consists of all documents required to accurately bid the project. Bid documents also include Addenda – a change to the original bid documents.
4. Plan Check – Submission of final design documents for code and occupancy use review and approvals. Generally consists of all bid documents and any changes resulting from the bid process.
5. Construction Documents – Modified bid documents incorporating all comments from bidding process and plan check. Documents used to construct project.
6. Contract Administration – Some Architects may also coordinate prime contract agreements and perform other contract administration activities for the owner.

Critical elements for Bid Manager and the Architect are as follows:

1. **Project information** – Each project will be set up with its own unique profile. The architect must be able to quickly point and click on Bid Manager's pre-defined lists. Preferences must allow non-applicable list items to be hidden for quicker set-up. Project information may include, but may not be limited to the following:
    a. Title
    b. Location
    c. Bid Date and Time
    d. Owner Information
    e. Architect Information
    f. Consultant Information
    g. G.C.'s Bidding Information
    h. Type of project (Up to 25 types)
    i. Estimated valuation
    j. General Scope of work description (100 words)
    k. UCI/CSI list of trades or key word indexing on disciplines required

Note: A cumulative list of bid participants by segment should be tracked and made available at the request of the security administrators.

2. **Bid document formats and organization** – Every project consists of plans, specifications, addenda and other related documentation. The purpose of these documents is to provide a consistent format for bid submission and create the basis for executing future contracts.

    a. **Plans** – Plans are typically prepared in a computerized format called ".dwg". Bid Manager's architectural interface must provide for simple project set-up and administration by the architect. Architects will not allow their .dwg files to be

publicly disseminated. Painless file conversion will be required for the following critical purposes:

1. Painless viewing while on-line
2. Downloading for electronic estimating
3. Downloading for digital printing

Individual plan sheets must be organized in folders by consultant discipline as follows:

1. Architectural
2. Structural
3. Plumbing
4. Mechanical/HVAC
5. Electrical
6. Landscape
7. Civil
8. Other

Note: If plans are not available in electronic format all efforts should be made to link the designated printer to the bid team for easy ordering of bid documents.

b. **Specifications** – Specification books are typically prepared in an electronic word processing program. All specification booklets will be converted to .pdf file format and organized by the industry standard UCI/CSI major division codes as follows:

01 – General Requirements
02 – Site Work*
03 – Concrete
04 – Masonry
05 – Metals
06 – Woods and Plastics
07 – Thermal and Moisture Protection
08 – Doors and Windows
09 – Finishes
10 – Specialties
11 – Equipment
12 – Furnishings
13 – Special Construction
14 – Conveying Systems
15 – Mechanical
16 – Electrical
17 – Other

* Note: Soils report documents will be contained within division 02 – Site Work

c. **Addenda** – Addenda must be treated as "Urgent" documents throughout the architecture. Addenda change bid dates, bid documents and bid meetings on a regular basis. Accurate bid submission is contingent on timely receipt of addenda information. A separate and distinct folder will house all addenda information and will be organized as follows:

- Addenda
    - Addenda 1 March 23, 1999
        - Plans
        - Specs
    - Addenda 2 April 2, 1999
        - Plans
        - Specs

Indexing all addenda information into a search index would greatly enhance the industry addenda processing problems. (Key word match and group by major CSI division) E-mail and paging services should be linked to the addenda processing system.

3. **Other Correspondence** – Architects and Engineers will require other basic tools for standard bid collaboration. The action list below represents a preliminary list that may change as feedback is received from beta testers:

    a. <u>RFI Processing</u> – RFI's or Request for Information correspondence is critical during the bid phase. General contractors often receive questions from qualified subcontractors regarding product specifications, installation details and/or alternate material submission. RFI's typically create addenda. Addenda legally modify the bid documents. The RFI processor is a simple word processing tool that automatically tracks and forwards information to the correct team menders – similar to Project Net's Submittal Processing system.

    b. <u>Alternate Product Inquiry</u> – Building Product Manufactures often submit requests for alternate materials when their product names are not listed in the specification book. Architects need an organized submission vehicle and a simple form of approval processing. HTML linking within the inquiry to the BPM's web site may greatly enhance this process.

    c. <u>Pre-Bid Meeting Notification</u> – Some projects require a pre-bid conference with the architect and the owner. Home Depot never bids a job without a pre-bid conference.

    d. <u>Electronic Bid Submission</u> – Most bids are submitted in person today; however, Bid Manager may modify this protocol. For this reason the system must support electronically submitted bids. The architect will want to create a bid form so that all the bids are consistent and easily evaluated. Contractors will simply fill in the blanks and click on SUBMIT BID NOW. The "submit bid now" screen would look nice with an analog clock in the corner!

e. Bid Withdrawal Form – Contractors often withdrawal from the bid process. A form with predefined reasons for the withdrawal will be helpful to notify all involved in the bid process to-date.
f. E-mail – We may want to provide free e-mail services.

The Print Network

A key ingredient for Bid Manager's success is the ability to process comprehensive reproduction services for plans and specifications. In a perfect world the architect will submit plans and specifications in formats that can be painlessly converted to printable images as outlined above. A significant portion of Bid Manager's e-commerce plan is to link digitally enabled printers to the audiences requiring hard copy plans and specifications. The print processing network should be designed as follows:

1. Utilizing the document organization structure shown above, the ordering system must allow picking and choosing of individual plan sheets and specification sections. Use "Add to shopping cart" methodology. Each set of bid documents must be packaged and re-capped by job title.
2. Provide for "frequent flyer" purchasing and/or large order discounts.
3. Provide comprehensive ordering, fulfillment and billing system. (Fed-x partnering?)
4. Potential for automatic profiled delivery system. (Painting sub wants Architectural sheets and section 09900 of the specifications delivered each week within a designated geographic location)

The General Contractor (GC)

The GC is responsible for providing an all-inclusive turnkey bid for the project. GC's are bound to their bid by language contained within the bid documents. The challenge for the GC is to get as many competitive bids as possible from qualified subcontractors and suppliers before the 2:00 PM deadline. Bid Manager will greatly enhance the GC's competitive capabilities by providing the following basic services:

1. Search for, or automatically receive, new bidding opportunities
2. Organizing and tracking a list of pre-qualified subs and suppliers
3. Access to hundreds of thousands of subs and suppliers that are organized by UCI/CSI trade codes
4. Automated fax and e-mail bid solicitation to subs and suppliers
5. Automated bid response from subs and suppliers
6. Automated print processing of plans and specifications from print network
7. Quick and simple RFI submission to architects and engineers
8. Speedy notification and delivery of addenda information
9. Easy processing of "Scope Letters", "Bid Memos" and "Bid Submission Forms" to team bidders

10. "Work from Anywhere" bid collaboration platform
11. Electronic bid submission from subcontractors and suppliers
12. Electron bid submission to Architects
13. Historical tracking and 24 hr. monitoring of bid process
14. Multi station bid processing within one seamless platform
15. Automated purchasing and award notification (contract processing)
16. Easy transition to "Web-based Project Management"

Following is a brief description of how each of the above features will function within the Bid Manager environment:

1. <u>Search for, or automatically receive, new bidding opportunities (marketing)</u>
   a GC's will utilize the "Project Data" as entered by the architect to find new bidding opportunities. Locating all industrial tilt-up bidding opportunities in a geographic region is one example of this valuable search benefit.
   b Many GC's will pay for Bid Manager to automatically deliver bidding opportunities based on pre-defined criteria. GC's can retrieve the data at any time while the system updates the mailbox, as new data becomes available.
   c After the project list is drilled down the GC will want to deliver a "Request to Bid" inquiry to either the architect or owner. This may become a form letter within Bid Manager.
   d A simple project tracking and calendar system will help GC's track and manage their bidding opportunities.
2. <u>Organizing and tracking a list of pre-qualified subs and suppliers</u>
   a. GC's will want to maintain and track their own private list of subs and suppliers. Bid Manager's database structure should allow GC's to manipulate and manage two sets of intelligent data. Subs and suppliers should also be capable of updating the profile directly, only if the GC's admin preferences are set accordingly.
   b. The database structure will mimic a typical contact management database, but will be uniquely organized by the UCI/CSI code indexing system. A one-to-many relationship must be available for subs and suppliers that perform more than one trade.
   c. Standard report writing should be provided for creation of printed lists.
   d. Basic import and export capabilities must be supported for easy set-up of the bidder list.
3. <u>Access to hundreds of thousands of subs and suppliers that are organized by UCI/CSI trade codes</u>
   a. This will be a major benefit of Bid Manager's product offering. GC's will use this data as a supplement to their private database of subs and suppliers. Similar to section 2 above, all data will be organized by the UCI/CSI index of codes and will be managed in a typical contact management database environment unique to construction bidding.

b. GC's must have the capability of moving data from the public list to their own private list. A distinction between the origin of data must be provided prior to adding to private list.

c. Subs and suppliers that pay for advertising will be listed in "Top-of-List" priority for easy selection by the GC.

d. General use fax and e-mail templates should allow quick and easy communications directly from the private or public list of subs and suppliers.

4. <u>Automated fax and e-mail bid solicitation to subs and suppliers</u>

a. The Bid Management capabilities of Bid Manager will become the heart of the product. GC's will need to organize a bid list quickly and notify qualified subs and suppliers by fax and e-mail.

b. Each project must be organized as its own entity. Many projects will be set-up by the owner or architect and forwarded to the GC for bid processing. Not all projects will be set up by the architect. GC's will use Bid Manager without electronic plans and specs.

c. All bids will be organized by UCI/CSI code indexing. Filtering out subs and suppliers by fields representing geographic bidding preferences will be supported. Locating subs with labor and other work preferences will also be required.

d. A point and click selection process will allow the GC to narrow don a preferred list of subs and suppliers.

e. Templates will enable quick and simple broadcast fax and e-mail processing.

f. Printed reports will facilitate the requirements of hard copy documentation.

g. Non bid related faxes and e-mails must be permitted within the system.

h. A 1-800-fax response server will be used to automatically rout RSVP's back to the appropriate GC. OCR recognition capabilities will be required for fax routing.

i. GC's will require bid solicitation activity reports showing bid coverage by UCI/CSI trade. If bid response is low additional faxes and e-mails will be sent to subs and suppliers selected from the public list.

j. Proof of "Good Faith" solicitation to qualified minorities, women, disadvantaged veterans and small business may be required on certain public works bids.

5. <u>Automated print processing of plans and specifications from print network</u>

a. Over $2.0 billion is spent each year on reproducing bid documents. Fed-x collects over $300 Million from shipping plans in tubes. Bid Manager will greatly enhance the printing and decimation process. GC's must have the capability of pre-purchasing plans for a select group of subs and suppliers. All other interested subs and suppliers must directly purchase from the printer. Pre-purchased plan information is not for public use.

b. GC's will want to submit an order to several vendors to obtain the best possible printing price.

c. The bid document-ordering module should be a unique feature of the interface – easy-to-use and reliable.

6. <u>Quick and simple RFI submission to architects and engineers</u>

a. GC's will need a simple template to create, submit and tract questions submitted to architects and engineers.

b. Utilize pull-down lists make RFI's easy to prepare and send.

c. Some of the RFI's will be directly forwarded to the architect as they come in from the subs and suppliers. Admin preferences should allow automatic forwarding with copies in the GC's inbox.

d. History tracking will be required.

7. <u>Speedy notification and delivery of addenda information</u>

a. The average bid experiences 5 addenda prior to bid day. Some projects will have 50 to 100 addenda. Addenda consist of revised bid dates, modified plans and specs, and adjusted meeting dates and times.

b. All addenda information will be housed in a separate folder called "Addenda" with sub folders called "Plans" and "Specs".

c. Special fields will be provided to capture modified bid dates or meeting dates. Other buttons may be used to signify changed plans or spec sections.

d. A key-word index can be used for automatic notification or search inquiry of trades affected by the addenda.

e. Addenda are typically labeled 1-N or A-Z.

f. All electronic bid submission templates should note receipt of addenda, i.e. This bid includes the following addenda…1, 2, 3 and 4.

8. <u>Easy processing of "Scope Letters", "Bid Memos" and "Bid Submission Forms" to team bidders</u>

a. GC's will use templates to organize questions and broadcast them to certain members of the bid team. This feature will help maintain, and possibly increase the GC's competitive edge.

b. All templates are UCI/CSI code driven – pull down list of codes.

c. Uses pull-down list of bid team based on selected codes for memo or scope letter.

d. Will need to fax and e-mail forms, similar to bid solicitation.

e. Unique folders house responses from subs and suppliers.

9. <u>"Work from Anywhere" bid collaboration platform</u>

a. Bid set-up stuff! Not complete yet! **************************

10. <u>Electronic bid submission from subcontractors and suppliers</u>

a. GC's will receive bids from subs and suppliers. Allowing the GC to prepare a custom bid form for each bid will help facilitate a consistent retrieval and bid evaluation process.

b. Many subs and suppliers will use a standard e-mail attachment protocol for submitting bid proposals. (Attach an Excel or Word file)

c. Subs and suppliers will want verification that the bid was delivered successfully.

11. <u>Electron bid submission to Architects</u>

a. Architects may want to prepare bid forms that can be submitted by the GC. GC's can fill in the blanks, add information and submit the bid via Bid Manager.

12. <u>Historical tracking and 24 hr. monitoring of bid process</u>

13. <u>Multi station bid processing within one seamless platform</u>

a. Large projects often require the efforts of several employees. Bid Manager should allow real-time access by to all levels of the application.

b. Standard AIA contract documents control 90% of the industry's agreements. Automating this piece of the business will require creativity and vision.

14. <u>Automated purchasing and award notification (contract processing)</u>
    a. After a bid is awarded GC's will need to lock-in material prices. Bid Manager should provide a simple contract purchasing and award processing system. This system will ultimately drive most of Bid Manager's future revenue.
15. <u>Easy transition to a standard project management package (Primavera, Meridian Systems, etc)</u>
    a. If a bid team utilizes Bid Manager to win a bid they will be highly motivated to continue the construction management process in a similar environment.

Subcontractors

It is important to understand that the subcontractor is the lifeblood of the general contractor. Deep relationships are nurtured and maintained in order to combat heavy bid competition. Bid Manager will flourish if the subs can enhance their bonds with the GC. The framers of Bid Manager must incorporate the ability to collaborate in an environment that is easy to use and highly secured.

While some of the more sophisticated subs will perform similar functions as the GC, the vast majority will expect the following capabilities:

1. Search for, or automatically receive new bidding opportunities
    a. Searching by using one or more of the following criteria will be required (including Boolean logic):
        1. UCI/CSI trade
        2. Key word(s)
        3. Project type (commercial, schools, retail, etc.)
        4. Geographic Location
        5. Valuation
        6. # of Days before bid is due
    b. Set preferences and have data automatically delivered to bid inbox
    c. Manage bidding opportunities in a calendar package similar to or linked to Outlook
    d. Directory services activity automatically sent to sub
    e. Directory services link to sub's web site
    f. Creation of a custom portal for the sub
        1. Marketing and promotion
        2. Manage relationships with BPM's

Suppliers, Wholesalers and Building Product Manufactures

One of the greatest challenges for the BPM segment is locating new projects during the design phase. As the Bid Manager piece becomes more populated with data the BPM will see great value in having access to the information. The BPM segment will require the following capabilities:

1. Same as sub above, and…
2. Receiving e-mail and fax leads from subs and G.C.'s
3. Sending quotes and/or bids to subs and G.C.'s
4. Locating projects containing their own products or the requirement for similar products
5. Hot-linking anyone to the BPM web site
6. Creation of a custom bid portal that meets Convex's standards for future e-commerce

Convex Technologies, Inc.

Functional Requirements
Project *Convex Internet Portal*

Date: 1/20/00
Version: 0.5

Functional Requirements Document

Weight: Must **(M)** indicates that a requirement is required for the initial release, Want **(W)** indicates that a requirement is highly desired and Nice to H **(N)** indicates the "Bells and Whistles".

Related Requirement: Identifies other requirements with a relationship to this requirement.

Development Effort: High **(H)**, Medium **(M)**, Low **(L)** identifies level of development difficulty.

Phase: **I, II, III,** and **IV** identify the phase in which the requirement will be included. **Noted** - Requirement to be fulfilled externally.

Source:

- ⇒ Larry Wares Input **LWD**
- ⇒ Larry Wares Specification **LWS**
- ⇒ Focus Group **FG**
- ⇒ Marv McCarthy **MM**
- ⇒ Larry Hartmann **LH**
- ⇒ Ray Morrison **RM**
- ⇒ eBuilt **EB**
- ⇒ Allof the above **ALL**

Achieved: **1** - met by internal development, **2** - partially met by internal development and external source, **3** – met by external source

	Data Conversion	Import will be from a common delimited file only - no need to concern which system the data is coming from					
	Data Conversion	Import capability to bring in all subs - how to sync this up with the public database?					
	Data Conversion	Must create map of private CSI codes to standard Convex Codes					
	Data Conversion	Select to convert private CSI codes to standard Convex Codes					
	Data Conversion	Import user's logo from BidFax					
	Data Conversion	Import BidFax letter text for freeform memos					
	Support Services / Call Center	Sales, Support, etc.					
	Billing	Billing Module must be flexible					
	Billing	Able to process credit card transactions - collect payment					
	Types of Documents (forms/templates)	Invitation to Bid					
	Types of Documents (forms/templates)	Addenda					
	Types of Documents (forms/templates)	Memo / Scope Letter					
	Types of Documents (forms/templates)	RFI					
	Types of Documents (forms/templates)	Other (Free Form) •Allow contractor to create own templates including their logo (.dcx file 8" x 3")					
	Types of Documents (forms/templates)	Instructions to Bidders					
	Types of Documents (forms/templates)	RFP					
	Types of Documents (forms/templates)	Bid Documents (Input to the GC) •Plans • Arch • Structural • P,M,E • L/S • Civil • Other •Spec's Book •Instructions to Bidders •Supplier Documents • Soil Report • Environmental Impact • Local Government Stuff					
	Types of Documents (forms/templates)	General Conditions and Fee Proposal					
	Types of Reports	Provide quarterly reports to show subcontractors how they could buy ratings					
	Types of Reports	Reports to monitor who is getting what communication					
	Document Management	Maintain log of documents and flow by project					

	Document Management	**Addenda management Is criticall** So important that it needs to be separated from the rest of the information. Red flags!!! •This raises the issue of confirmed delivery - liability - create log that item has been opened and display this •Timing Issue since so many bids come in just prior to 2pm •Provide the capability of sending the bid form back to the GC - along with confirmed delivery					
	Document Management	Capability to selectively send documents (plan voucher) to specific constituents					
	Document Management	Trades should only have access to documents important to them - regulated by a GC (narrow the scope)					
	Document Management	Will need to be a provision for associating documents with different groups in process					
	Document Management	Capability of GC to share bid $$ with subcontractors to see low bid					
	Blueprint Order Management	Authors designate a budget for printing plans					
	Data Integrity	Must have capability of tracking changes that need to be made to public database info • inform subcontractor of changes for them to update or permission to update					
	Data Integrity	Synchronization of data not only between Convex and private but also by Codes that might not match					
	Private Database Information	Save additional information on private database with some methodology of updating from public					
	Private Database Information	Capability of GC's maintaining secured information					
	Private Database Information	Capability of storing data from Private database to user's desktop PC and then sync back to the Private database					
	Public Database Information	Capability of requesting Convex to add to the standard CSI codes					
	Public Database Information	Import data from public data sources: •Directory Services •Product Database					
	Worklist	Maintain current status in the bid process					
	Global Preferences Setup - Registration	Must have capability of adding multiple users under single company account with separate logins •Convex Administrator •Project Authoring •Bid Management •Portal User					
	Global Preferences Setup - Registration	Single User setup vs. Multi User - one of first questions asked and this drives many of the subsequent options					
	Global Preferences Setup - Registration	Separate Logins for each user under a customer					
	Global Preferences Setup - Registration	Email acceptance from constituents					
	Global Preferences Setup - Registration	Private data update from Convex Public •Always Update •Manually Update •Global Refresh - this may not be on main preference page					

	Global Preferences Setup - Registration	Prior to conversion must create a CSI map – GC					
	Global Preferences Setup - Registration	Assign rights to users based upon roles					
	Global Preferences Setup - Registration	Ability to Identify "Accept Solicitations"					
	Global Preferences Setup - Registration	Profile setup including regions of work					
	Global Preferences Setup - Registration	Publish Bid Award preference (yes/no) •Disclosure • Price Only • A+ Sub Info					
	Project Preferences Setup	Each constituent should be able to Identify visibility for lists, documents, data, etc.					
	Project Preferences Setup	Owner / Arch / Eng. needs to be able to specify that access to sublists is required					
	Project Preferences Setup	Specify whether blueprinting would be open for bid from blueprinting companies					
	Presentation / Information Views / Display / Useability	Make it sticky and simple - they will never go back to their previous way of doing business					
	Presentation / Information Views / Display	Display email Information for subs by different sorts					
	Presentation / Information Views / Display	Lists to show separation of Private List from Convex List (temporary from the Convex public database for use on specific project)					
	Presentation / Information Views / Display	All constituents need to be able to sort or group their information (outlook like) - different inboxes					
	Presentation / Information Views / Display	Browser plugin to have capability of displaying any type of document					
	Presentation / Information Views / Display	Capability of viewing plans from applications other than Autodesk					
	Misc.	Feedback feature - capture feedback (comments, new requirements, ideas)					
	Misc.	Unique identifier for each job - huge number???					
	Misc.	Capability of running a daemon that will talk to Convex and bring down information					
	Misc.	Referral capability – let other GC know about a subcontractor					
	Misc.	Capability of adding additional items to lists at anytime in the process (example of needing additional CSI codes)					
	Misc.	Identify active participants in the bidding process – track who is responding					
	Misc.	Capability of handling a new subcontractor registering in Convex but not currently on any Convex GC's private list. How do they join the group?					
	Misc.	Handle a sub that was invited to participate in a bid but not yet in Convex – hand holding?					
	Data Collection on Web Activity	Mechanism to track responses and track hits on Information collected					
	Data Collection on Web Activity	Collect data regarding project costs - report by user defined criteria					
	Communication Capabilities	Capture comments on use of system (Convex Inbox) – feedback, new requirements, ideas					
	Communication Capabilities	Capture complaints regarding constituents					

	Communication Capabilities	Provide email capabilities - separate from their construction email						
	Services Provided	Offer Web page hosting for Subs that would be standardized according to CCR - find data in same place on all pages						
	Services Provided	System can automatically send notification of bids outside of your region matching your profile (based upon subscription)						
	Security	Capability of reporting activities of user accounts under company account						
	Security	Encryption process to secure document, specs, etc.						
	Marketing / Referrals	Based upon bid awards market to suppliers - establish a referral fee (Convex take) on purchases						
	Interfaces	Project News						
	Interfaces	Industry News						
	Interfaces	Credit ratings						
	Interfaces	Jobs on line						
	Try it	Free Bid Manager •"from the creator of bid fax"						
	Try it	Sponsored Computers, ISP, DSL, Printers						
	Try it	Netcentives						
	Try it	Registration must be easy & quick • Temporary Classifications • Before they're approved						
	Try it	Pre-populated Directory by Every industry						
	Try it	Fast						
	Try it	BPM will help me estimate						
	Easy & Intuitive	I'm in a Database Already						
	Easy & Intuitive	Account Managers for the Biggest 400						
	Easy & Intuitive	Account Managers for the First 100						
	Easy & Intuitive	Must be iterative • Don't want to go back through if I forget something						
	Easy & Intuitive	Easy to Learn & to Use						
	Easy & Intuitive	Drop Down Menu Choices • See all the Choices in One Viewing • Drop Down Doesn't Cover-up Other Useful Areas on the Screen						
	Great Experience	Be able to use the Tools to Compete & be Creative •Build Own System						
	Great Experience	The more I use it the more I customize it the more valuable this site is						
	Great Experience	I like using it even though the sub made me use it						
	Great Experience	User will say "These are things I never thought of" •*Let's list these*						
	Great Experience	You can access your work from anywhere						
	Great Experience	Demo to show the power of their new tool						

		•also show what they need to do to take advantage of each feature • set up					
	Faster Better Cheaper	Better Bid Bond Rate					
	Faster Better Cheaper	Various People can use it in same company					
	Secure, Private, & Reliable	How do you keep a nobody from registering as a gc even though I'm nothing •Membership for Security					
	Secure, Private, & Reliable	Prevent a Sub from out of the Blue from just throwing out a bid to that creates a frenzy •Pool Complaints to Delete from System					
	Secure, Private, & Reliable	Confidence					
	Service	Cisco Model					
	Service	Call Center - IMA in Irvine • FaceTime • Convex Call Center Calls the user when user hits the button					
	Service	Phenomenal Help Function					
	Service	Suggestions & Customer Service					
	Easy to Switch to	Looks like your old fax- so people don't throw it away as something unfamiliar					
	Fun	My Cursor is a door handle if I'm a door sub					
	Issues	Faxes may not be free 20-30million/ month •Maybe the first 100 for free					
	Issues	Issue - you've got my guy on you public database and I don't like that					
	Issues	Issue - if my codes don't match I have to do a map - only gcs need to map • my bathroom is your surgical room • Use a temp code if you want to w/ a "t" in the front • we need a wide variety for beta					
	Issues	Issue - first thing I have to do is map - if I want to use the public					
	Issues	Issue - is it set up at co level or individual level or mix					
	Issues	Issue - how do we keep sub from asking for plans just so the gc doesn't know he already got them					
	Issues	Issue - - how do I get myself off public database					
	Issues	Issue -employers don't want employees on Internet					
	Technology	Use faxes if you want					
	Technology	GC & Subs need to be able to choose to send & receive fax, email, data, page, call, some or all					
	Technology	I can get myself into a database					
	Technology	I can download my Private Database & carry it with me on my laptop or Palm Pilot					
	Technology	Build my own private database on set up menu					
	Technology	I can import my bidfax,outlook, & act files					
	Technology	"Hot office" to handle multiple people & offices • co acct. or indiv acct. - co. based w/ individuals use • (How will users accept this complexity)					
	Technology	I will see which fields in my private database have been updated by the public database					
	Technology	I can tell which fields I have updated or changed from public					
	Technology	I can update it when I feel like it					
	Technology	I can have some customized fields for my private database					

	Technology	Role based security					
	Technology	Security so you can't see how I'm organizing & who I'm sending to					
	Technology	Is it going to be windows only or webtv UNIX Mac, net clients?					
	Technology	Give people the capability of receiving faxes on bid day					
	Technology	Conversion from bid fax to Convex					
	Technology	Personal email change or forwarding is easy					
	Technology	Custom web page					
	Technology	Convex takes care of back-ups					
	Technology	I'll get an email suggesting changes to my file e.g. area code change					
	Technology	Easy to Update					
	Technology	Invisible Technology					
	Technology	OCR for fax response					
	Technology	Easy to recall password if forgotten					
	Marketing	Time to Market •GC needs to get subs involved in first 3 days to beat competitors •6 hr. or overnight to fax v. 15 min to get faxes out					
	Marketing	Incorporate your logo					
	Marketing	I can find subs in Las Vegas even though I've never been there					
	Marketing	I can register and tell you exactly what I do					
	Marketing	Summary of current Convex activity • e.g. there are 165,000 projects w/ 16,500 in your area of which 2,350 have specialized door needs					
	Marketing	I can see my competitors - (good & bad)					
	Marketing	When you get a project w/ my profile send it to me					
	Marketing	Users web sites will link to ours and our features					
	Marketing	Brand					
	Marketing	Targeted Marketing					
	Marketing	Stepped Membership					
	Marketing	Universal Bid Opportunities					
	Marketing	I'm not looking for projects I'm looking for GC's w/ projects					
	Marketing	Can find competition					
	Marketing	Silver upgrade projects just outside your area - you can get a report					
	Marketing	Notice if there are a lot of projects just outside user's parameters that they would not know about					
	Tools	Can Originate or Use "off the shelf" Templates •Templates can be based on: • Owners e.g. Home Depot • Type of Construction e.g. Tilt-up, Bridge, etc. • Standard Bid Form • Exception Templates • Can Match users Word doc to the Send List • Reports or Forms – need some examples • Templates should be available for any type of use that makes sense • *Need to identify other areas where Templates would be useful*					

PRINT OF DRAWINGS
AS ORIGINALLY FILED

		•*Need to Identify "off the shelf" Templates that Convex will provide* •Templates can be partially completed by Convex dependent on the amount of information they give us • The more you give Convex the more we can help you						
	Tools	Organizational Tools (similar to Hot Office Functionality) •Calendar •Scheduler •Tasks •Notes •Journal •Bulletin Board						
	Tools	*Need to Identify more Tools*						
	Information	Find Decision-makers that actually have the Project or Will Get the Project •"I'm not looking for projects I'm looking for GC's w/ projects" •How do we know who will get the project or who got it?						
	Information	Public Database •Used to Grow Private Database •Used to Develop Ad Hoc Databases in Conjunction w/ Private Database • i.e. Categorized Private Lists • e.g.Las Vegas Database						
	Information	Dun & Bradstreet Tie-In						
	Information	Sweets Catalog for BPMs to show specs & details -shows Specs & Details for Products						
	Information	Referential Marketing •*Check Legal Aspects*						
	Information	Can Sort Results by Convex Rating System •*How are we going to rate them?*						
	Information	Content •Project News •Specific Project News •Industry News • e.g. Cost of Lumber Projections •*Need a list of Sites to Tie to*						
	Information	Access to Building Directory Services •e.g. Insurance, Bonding, Financial, Travel, Banking, etc. • *Need to Identify all Services*						
	Information	Access to Construction Information •e.g. Lien Laws, Local Gov't Contacts, etc. • *Need to Identify all Information*						
	Information	Forum - off line chat •Archived						
	Information	Other Entities can Observe What I'm doing & I can Observe them •Nobody can see how I'm putting a bid together unless I let them						
	Reports	Simple, Easy to Read & Understand reports						

	Reports	Monitor Bid Coverage •Easy to Monitor • *What will make it easy* •Sensitivity Factors • *What Factors do you need to watch* •Responsiveness •Analysis • *What ratios do we want to use?* •Plan Acceptance by Subs • "Subs aren't accepting your plans, but want to bid - looks like you're getting in too late" •Specific Reports • e.g. owner can review minority women coverage • e.g. you've got to be able to show the union you tried to get them involved • *What are all the reports we need to build?*					
	Reports	Reports on my Convex Activity •report can tell me how I can do better - e.g. become a silver or bronze •*What else?*					
	Reports	Reports on my Convex Benefits •there have been 30,000 people looking for painters get going •*What else?*					
	Other Day to Day Functions	Personalized					
	Other Day to Day Functions	Role Specific					
	Other Day to Day Functions	Search Results •Categorized • Not Obscure Titles					
	Other Day to Day Functions	Generals can Control Specs & Plans •What specifically does this mean?					
	Other Day to Day Functions	Anybody can Author Project					
	Other Day to Day Functions	Able to Customize Specs & Other Documents •*What are the other documents?*					
	Other Day to Day Functions	Architects & Others don't have to use UCI/CSI					
	Other Day to Day Functions	Able to deal w/ deposits for plans					
	Bid Info	Control Communication Coming to You & Lists You Send to •Specify Type of Info to Receive by Type & by Sender •Specify Type of Bids to Accept & Distribute by Preferences •Flexible Specifications by Categories & Subcategories					
	Bid Info	Organization •Gives Summary of what's in the System - e.g. 3 negotiated 12 private 16 public •Organized in Tree Format like Outlook • Default Tree • Wizard can help Customize					
	Bid Info	Can Categorize by Yes, No, Maybe, Trash Can, In Process					
	Bid Info	Can Categorize by Contractor					

	Bid Info	Can Categorize by Project						
	Bid Info	Can Prioritize by Contractor, Project, Most Recent Message, Urgent Messages, Type of Message, Open v. Unopened, Flag Status						
	Bid Info	Categorization & Prioritization Filtered by System						
	Bid Info	Strings on Wall to Organize Project Information Flow • Organize RFI						
	Bid Info	Features •Confirmation of Delivery [liabilities] • Sent • Received • Viewed •History Log like blueline/online • When Recipient opened it, how long it was open, how many times they opened it •Can view Activity Along the Whole Chain w/ Permission •Can Disassociate Companies that aren't Responding to an Individual Project or in General •Notification that plans have been ordered and sent •If email Isn't Viewed In a Specified Amount of Time a Fax or Page can be Sent •If a Response Isn't Received in Specified Time another Email Can be Sent to ask If they want it or not •Recipient can Respond back on the Same Email received •Always Accept Feature •Inbox Search Function •Archive •Failed Faxes w give me a reason why •GC must be able to customize information from A/E •GC must be able to flag packets e.g. Mervyns generators						
	Addenda	Addenda can have Separate Inbox & Paging						
	Addenda	Cut & Paste Addenda Received so its Relevant to Who you Pass It on to						
	Addenda	Sending of Addenda can Activate Paging						
	Addenda	Strategy • Only send addenda to who you really want to or are working w/ so it doesn't flow back up to your competitor • Send Memos and addenda to active participating pieces						
	Other Features	Fax back to GC direct or through our system so we could track						
	Other Features	I can send my private record of my favorite framer to my brother in law who's getting started						
	Other Features	Cant spam the group • Charge for huge volumes of mail						
	Other Features	Even though the recipient might match 50 codes e.g. supplier - only one fax Is generated not 50						
	Other Features	May be their only email						
	Other Features	Junk Mail by Category						

	Other Features	GC must push info down					
	Other Features	If I don't get the job I'll tell my subs where all the subs came in at - w/o name unless public					